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ABSTRACT

This document presents the appendices for the final research report for a project designed to produce an experimental learning package in energy conservation for members of the home building industry. (SL)

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APPENDICES

A LEARNING PACKAGE IN ENERGY CONSERVATION FOR PARTICIPANTS IN THE HOME BUILDING INDUSTRY

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All opinions, findings and conclusions expressed in this report are those of the authors and do not necessarily reflect the views of the U. S. Office of Education or the Department of Health, Education and Welfare.

APPENDIX A

A. Modeling the Curriculum Development Process

This project is, in essence, a curriculum development project. The primary goal of the project is to develop curricular materials, which when used, should produce knowledge, attitude, and behavioral changes in home builders, developers, contractors and financiers, relative to energy conserving design of houses. The process is based on a multi-disciplinary team approach which has brought together a staff from across three different professions--architecture, marketing, and education--whose single purpose is the development of the curricular material related to the project goal and its delivery to the target group in the most effective manner.

When any curriculum development project is undertaken, it is necessary to develop a clear, comprehensive model that serves as the conceptual framework for the curriculum development processes. Such a conceptual model is indeed essential when people from such diverse backgrounds attempt to work together.

The curriculum development model* designed for this project serves two very important functions. First, the model specifies major curriculum development process components inherent in the project. The relationships between and among the various components of the model are illustrated. Second, the model is somewhat linear providing some guidance in the developmental activities of the project.

While the model is laid out in a linear fashion, the intent is that the model be only partially linear. There are a number of

*The model designed for this project utilizes a basic structure discussed by Glenys Unrich in her book, Responsive Curriculum Development: Theory and Action. McCutchan Publishing Company. Berkeley, 1975. A number of modifications have been made in Unrich's model to meet the needs of our project.

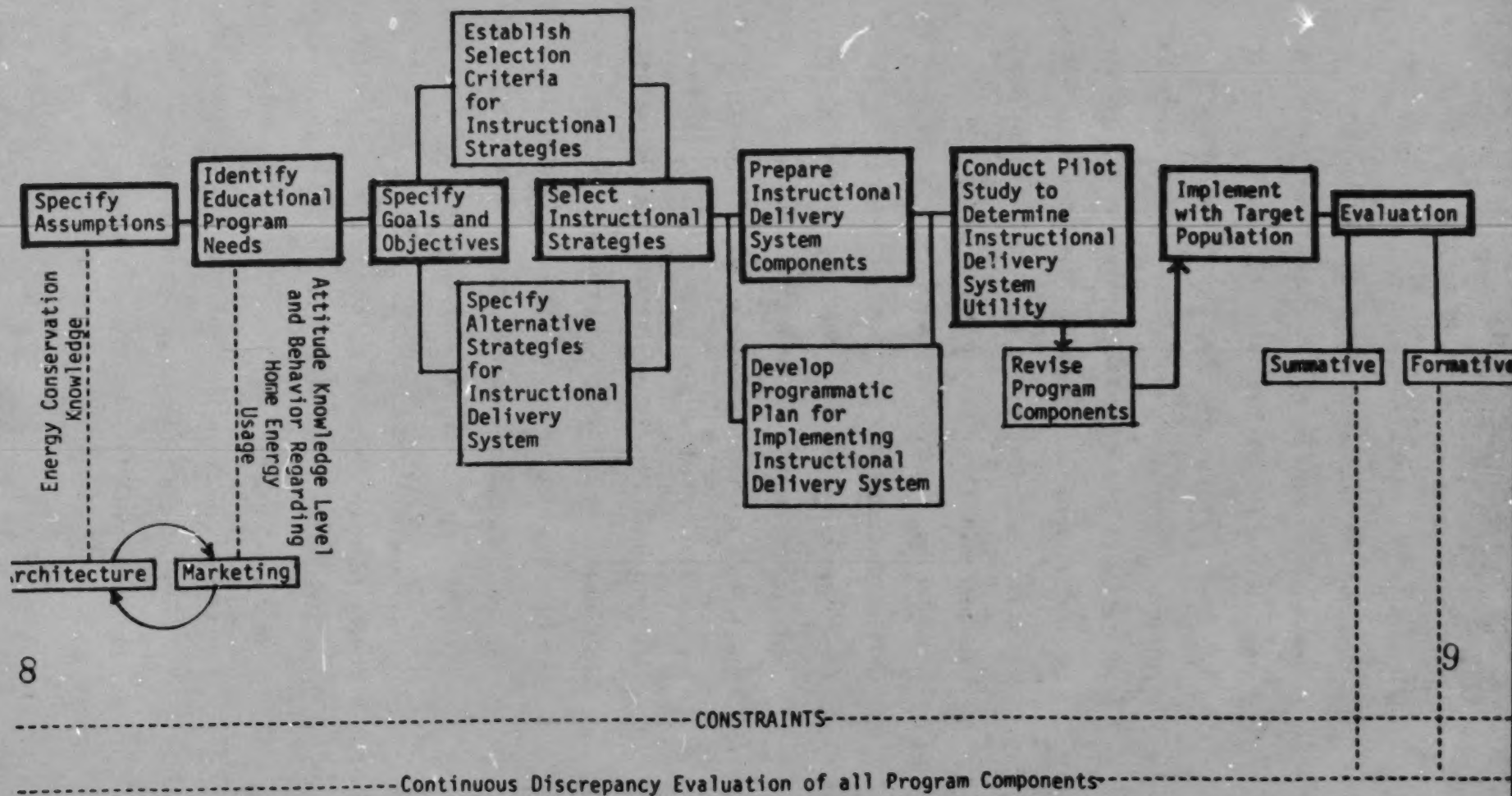
components of the model functioning simultaneously, even though they are represented as linear. The use of continuous feedback also precludes the absolute linearity of the model.

The curriculum development model for this project is systemic in nature. As such, the model should be viewed as having a set of major systems with some subsystems functioning as inputs to the major system. The major systems of the model are all one horizontal plane and outlined in heavy type. (See the model on the following page.) All sub-systems are represented on other horizontal planes.

The remaining discussion addresses itself to an explanation of all of the components of the curriculum development model for the project.

Specify Assumptions: Whether curriculum developers admit it or not, at the onset, and through the evolution, of a curriculum development project certain assumptions are made by project. Often times these assumptions, if not dealt with consciously, can impede activities associated with the curriculum development processes. Therefore, at the onset of this project, assumptions governing the operation of the project are made public for all those involved in the project. Arriving at these assumptions requires input from all project staff in order to insure clarity of initial operational bases.

Educational Needs Relevant to the Project. The identification of needs to be met is perhaps the most critical function of any curriculum development project. It is upon such needs that the total program is based. The educational needs inherent in this are identified by two main processes: (1) a review of literature and (2) the data resulting from a survey of the target group undertaken by the marketing component. The needs which this project will attempt to meet are stated in terms



of knowledge, attitudes, and performance, relative to energy conservation in single family houses. The educational needs flow from needs identified by each of the two major project components as discussed below:

Architectural Needs. The knowledge, attitude, and performance needs growing out of architecture are specific to the discipline of architecture. As such, the knowledge identified by architecture comes primarily from literature on energy consuming design techniques. Some of the knowledge gaps among the target population related to energy conserving architecture will be identified through data resulting from the marketing survey.

Marketing Needs. The marketing component of the project is primarily concerned with the issue of the marketability of various energy conserving design features alluded to in the project as also the present attitudinal disposition of the target population toward energy utilization and conservation. As such, most of the marketing information needs will be generated through a survey conducted by this component. The data generated by this survey will serve a vital function in total project operation, and particularly so in the design and use of the curricular materials generated through the project.

Given the two needs sub-systems, the information flow into the educational needs major system is along two different lines. One line of information flow is concerned with general energy conservation knowledge. This information comes from the architectural component relative to energy conservation systems.

The knowledge represented herein is general and has generalizability into many different arenas. The second line of information represents a specific attitude, knowledge, and behavioral information resulting from the marketing survey. The information generated through the survey employed in this project has a more limited generalizability. Collectively, these two thrusts will provide the educational needs base for the project.

Specify Goals and Objectives. This component of the model is the next major system of the model. Inherent in this system is the generation of broad general goals of the project first, with the statement of more specific objectives coming with the various curriculum pieces.

Once the goals and objectives have been identified and stated, two parallel sub-systems must be attended to before the next major system of the model can be realized.

Establish Selection Criteria for Instructional Strategies. Given the goals and objectives, based upon needs identified by the architecture, marketing, and education components, a list of criteria will be generated which will serve as limits to the kinds of instructional activities appropriate for the project. These criteria should reflect human and material resource constraints. When such criteria are generated prior to the design of various instructional activities, fewer problems result in the development of those activities.

Specify Alternative Strategies for Instructional Delivery System.

This component of the model requires that several alternative instructional strategies be identified as possible avenues to be explored in the instructional delivery system. These strategies should be based on instructional literature as valid and reliable approaches

to the delivery of various types of content.

Select Instructional Strategies. Using the criteria generated in the previous sub-system, the list of alternative instructional strategies will be analyzed with the final selection of instructional strategies for the project resulting. Certain strategies will be selected to satisfy given needs while others will function to meet other needs.

Prepare Instructional Delivery System Components. Once the appropriate strategies have been identified for given objectives, the next step involves the preparation of the curricular materials constituting different instructional delivery system components. To insure adequate preparation of materials total staff involvement is essential. In addition, media specialists will be employed on a part-time contractual basis in order to produce high quality curricular materials.

Develop Programmatic Plan for Implementing Instructional Delivery System. Having completed all of the instructional delivery system components, the next task identified in the process model is to develop a programmatic plan for implementing the instructional delivery system. In reality, the conceptualization of this plan is an evolutionary process beginning even with the assumption stage and continuing to evolve throughout each segment of the project model, and finally culminating in this phase of the model. The plan evolving employs all the input information to date in the project resulting in a set of procedures to be followed by project in using the instructional materials with the target population. The curriculum organization pattern for the project curricular components is most critical in this stage.

Conduct Pilot Study to Determine Instructional Delivery System

Utility. After developing the instructional delivery system components, and putting those components together into some programmatic plan, the next step indicated by the project model is the field testing of the instructional delivery system. The purpose of this pilot study is to obtain data relevant to the use ability of various instructional delivery system components as well as the utility of the programmatic plan. The formative data generated by this stage may result in modifications going all the way back to the assumptions stage, or, to any previous point in the model. However, it is highly unlikely that any major revisions would result from the pilot.

Revised Program Components. Depending upon the data generated in the pilot study, modifications in program components will be made in order to improve the utility of the instructional delivery system. As discussed in the preceeding section, it is highly unlikely that major revisions will be needed in the instructional delivery system. However, we do expect some slight modification will be necessary.

Implement with Target Population. Having once conducted a pilot test of the program and made any necessary changes in program components to insure utility of the components, the instructional delivery system will be employed with a representative sample of the target population. This phase will be the culminating point for the many developmental activities which preceeded it in the project model. The project components will be implemented with a target population composed of builders, developers, contractors and financiers, engaged in home building activity within the study area. The purpose of this stage of the model is to test for the degree to which the project achieved its primary goal to change, through exposure to the instructional

material and the delivery system, the attitudes, knowledge and behavior of its target population relative to home energy conservation.

Evaluation. The evaluation stage of the model has two basic components, summative and formative evaluation. It should be noted that the evaluation model will deal with both these components much more thoroughly than done here. Both the formative and summative evaluation components extend to a base line called "continuous discrepancy evaluation of all components." This serves to illustrate that discrepancy model will be employed throughout the project.

Summative Evaluation. This type of evaluation represents an attempt to gather information relative to the degree to which project components were able to bring about desired results as specified in the project proposal. It is expected that this evaluation will take the form of an experimental design posited to test relationships between variables under study in the project. The results of this evaluation will provide information relative to the possibility of using the system with other populations to achieve similar ends.

Formative Evaluation. We have placed formative evaluation last in the model to illustrate our contention that every phase of the model (project) should constantly and continuously formatively evaluate. Such continuous evaluation is needed to provide feedback into all phases of the project so that the most viable instructional program can be developed given the limits of the project.

Constraints. Continuing across all aspects of the model is a section called constraints. This is done to illustrate that the project staff is continually alerted to any, and hopefully all, constraints which have the potential to interfere with the successful operation of the project.

APPENDIX B

SURVEY OF BUILDERS
CONSUMERS AND FINANCIERS

March - April 1976

SURVEY METHODOLOGY

Two groups of people were surveyed for this study--consumers and builders.

The consumer sample is based on 100 respondents who purchased a new home within the past year. Half of the interviews were completed with men and half with women. The interviews were conducted in person in the respondent's home.

The builder sample is based on 75 personal interviews conducted at the respondent's place of business. The list of potential respondents was developed from the membership list of the Greater Houston Home Builders Association and the telephone book yellow pages. In the majority of the cases, the president or owner was interviewed.

A different questionnaire was developed for each survey group; however, many questions were the same on both of the questionnaires for comparative purposes.

The order in which the concepts were presented to respondents during the interview was rotated to prevent order bias.

An analysis of the general findings is presented on the pages to follow.

Analysis of the Builder Sample

Section A--Energy Shortage

1. A total of 43% of the builders definitely believe that there is an energy shortage, another 28% are of the opinion that there seems to be an energy shortage, and 29% do not feel there is an energy shortage in the United States today.
2. While only 27% of builders who feel there is an energy shortage rated the "waste of energy in design and operation of homes" as an extremely important factor, 67% responded that this factor is "very" or "extremely" important. Only 5.8% rated this factor as being unimportant. Builders do appear to be aware of energy waste in homes.
3. Approximately 29% of builders rated residential dwellings extremely important as a source of energy savings and another 42% rated it as very important. While residential dwellings ranked fourth behind automobiles, manufacturing plants and commercial buildings as an extremely or very important source of energy savings, the fewest number of respondents (1.9%) rated this factor as unimportant.

****ENERGY CONSERVATION STUDY****

****BUILDER SAMPLE****

TABLE (A) 2 IMPORTANCE OF FACTORS IN CAUSING OR CONTRIBUTING TO THE ENERGY SHORTAGE

	BUILD SOME HOUSES					**HOUSES UNDER**		
	IN THIS PRICE RANGE					**CONSTRUCTION**		
	UNDER \$30K-	\$30K- \$49K	\$49K- \$74K	\$74K- \$99K	PLUS	UNDER 25-	25- 50	PLUS
TOTAL	\$30K	\$49K	\$74K	\$99K	PLUS	25	49	PLUS
BASE (FEEL THERE IS AN ENERGY SHORTAGE)	53	4	37	27	19	26	8	18
RATED FACTOR EXTREMELY IMPORTANT...								
CITIZENS HAVE BEEN WASTEFUL	41.5	50.0	45.9	37.0	36.8	42.3	37.5	38.9
AMERICAN AUTOMAKERS	37.7	50.0	43.2	37.0	26.3	42.3	37.5	33.3
WORLD RUNNING OUT OF FUEL SUPPLIES	35.8	25.0	35.1	37.0	36.8	30.8	37.5	44.4
WASTE OF ENERGY IN DESIGN AND OPERATION OF HOMES	26.4	-	29.7	14.8	31.6	26.9	12.5	27.8
EFFORTS OF ENVIRONMENTALISTS TO PREVENT POLLUTION	11.3	-	16.2	7.4	10.5	11.5	-	16.7
RATED EXTREMELY/VERY IMPORTANT...								
WORLD RUNNING OUT OF FUEL SUPPLIES	67.9	100.0	70.3	70.4	63.2	61.5	62.5	77.8
EFFORTS OF ENVIRONMENTALISTS TO PREVENT POLLUTION	41.5	50.0	51.4	37.0	31.6	30.8	50.0	55.6
WASTE OF ENERGY IN DESIGN AND OPERATION OF HOMES	67.9	75.0	67.6	59.3	73.7	61.5	87.5	66.7
CITIZENS HAVE BEEN WASTEFUL	77.4	100.0	75.7	81.5	68.4	76.9	87.5	72.2
AMERICAN AUTOMAKERS	69.8	100.0	67.6	70.4	68.4	73.1	75.0	66.7
RATED UNIMPORTANT...								
EFFORTS OF ENVIRONMENTALISTS TO PREVENT POLLUTION	20.8	-	16.2	18.5	15.8	38.5	-	-
WASTE OF ENERGY IN DESIGN AND OPERATION OF HOMES	5.7	25.0	5.4	7.4	5.3	7.7	-	5.6
WORLD RUNNING OUT OF FUEL SUPPLIES	3.8	-	2.7	3.7	10.5	3.8	12.5	-
CITIZENS HAVE BEEN WASTEFUL	1.9	-	2.7	3.7	-	-	-	5.6
AMERICAN AUTOMAKERS	1.9	-	2.7	3.7	-	3.8	-	-

****ENERGY CONSERVATION STUDY****

****BUILDER SAMPLE****

TABLE (A) 3 IMPORTANCE OF FACTORS AS A POTENTIAL SOURCE OF ENERGY SAVINGS

	--BUILD SOME HOUSES--				*--HOUSES UNDER--*			
	--IN THIS PRICE RANGE--				*--CONSTRUCTION--*			
	UNDER \$30K-	\$30K- \$50K-	\$75K	PLUS	UNDER 25-	50		
	TOTAL	\$30K	\$49K	\$74K	PLUS	25	49	PLUS
	-----	-----	-----	-----	-----	-----	-----	-----
BASE (FEEL THERE IS AN ENERGY SHORTAGE)	53	4	37	27	19	26	8	16
RATED FACTOR EXTREMELY IMPORTANT...								
AUTOMOBILES	50.9	75.0	45.9	48.1	42.1	53.8	62.5	38.9
COMMERCIAL BUILDINGS	49.1	50.0	51.4	40.7	36.8	50.0	37.5	30.0
MANUFACTURING PLANTS	49.1	25.0	51.4	44.4	42.1	46.2	37.5	55.6
RECYCLING OF PACKAGING & CONTAINERS	32.1	50.0	35.1	25.9	26.3	34.6	12.5	38.9
RESIDENTIAL DWELLINGS	29.3	25.0	32.4	25.9	15.8	42.3	12.5	16.7
APPLIANCES	9.4	-	10.8	11.1	10.5	11.5	12.5	5.6
RATED EXTREMELY/VERY IMPORTANT...								
AUTOMOBILES	88.7	100.0	86.5	85.2	89.5	92.3	100.0	77.8
MANUFACTURING PLANTS	86.8	100.0	86.5	88.9	84.2	80.8	100.0	88.9
COMMERCIAL BUILDINGS	81.1	75.0	81.1	77.8	78.9	80.8	87.5	77.8
RESIDENTIAL DWELLINGS	71.7	75.0	70.3	70.4	68.4	73.1	87.5	61.1
RECYCLING OF PACKAGING & CONTAINERS	60.4	75.0	70.3	59.3	47.4	61.5	37.5	72.2
APPLIANCES	39.6	50.0	43.2	48.1	26.3	42.3	37.5	38.9
RATED UNIMPORTANT...								
APPLIANCES	13.2	-	16.2	7.4	15.8	11.5	12.5	16.7
RECYCLING OF PACKAGING & CONTAINERS	13.2	-	10.8	18.5	21.1	15.4	25.0	5.6
COMMERCIAL BUILDINGS	3.8	-	2.7	7.4	5.3	7.7	-	-
RESIDENTIAL DWELLINGS	1.9	-	-	3.7	5.3	3.8	-	-
MANUFACTURING PLANTS	1.9	-	2.7	-	-	-	-	5.6
AUTOMOBILES	-	-	-	-	-	-	-	-

Section B--Purchase of Home

1. When asked to rate factors consumers consider in the purchase of a new home, only 8% of the builders rated energy saving design features as extremely important. Of the eleven factors rated, this factor tied with "efficiency rating of central air system" for the tenth position in the number of respondents saying it was extremely important in the purchase decision, above only landscaping. The percentage of builders rating energy saving design features as extremely or very important did increase to 40% but only moved up to eighth in the proportion of builders saying it is extremely or very important.
2. Approximately a fourth of the builders see this factor as being unimportant in a consumer's decision to purchase a new home.

NOTE: Builders need to be convinced that consumers want energy saving design features in their homes before they are taught about various energy saving techniques.

TABLE (B) 2 IMPORTANCE OF FACTORS IN DECISION TO PURCHASE NEW HOME

	--BUILD SOME HOUSES--				*--HOUSES UNDER--*			
	--IN THIS PRICE RANGE--				*--CONSTRUCTION--*			
	UNDER \$30K-	\$30K- \$49K	\$50K- \$74K	\$75K PLUS	UNDER 25-	25- 49	50 PLUS	
	TOTAL	\$30K	\$49K	\$74K	25	49	PLUS	
BASE (NUMBER OF RESPONDENTS)	75	9	51	38	25	39	12	23
RATED FACTOR EXTREMELY IMPORTANT...								
LOCATION OF SUBDIVISION	56.0	44.4	54.9	65.8	52.0	66.7	50.0	43.5
BUILDER'S REPUTATION	54.7	66.7	54.9	42.1	64.0	61.5	91.7	26.1
AMOUNT OF MONTHLY PAYMENTS	53.3	66.7	68.6	47.4	36.0	51.3	66.7	52.2
TOTAL PRICE OF HOUSE	40.0	44.4	47.1	36.8	32.0	41.0	50.0	34.8
QUALITY OF CONSTRUCTION	30.7	22.2	33.3	26.3	32.0	38.5	25.0	21.7
AMOUNT AND TYPE OF INSULATION	26.7	33.3	35.3	21.1	24.0	30.8	25.0	21.7
DOWN PAYMENT REQUIRED	25.3	-	35.3	23.7	12.0	28.2	25.0	21.7
INTEREST RATE ON LOAN	20.0	11.1	29.4	15.8	16.0	23.1	25.0	13.0
ENERGY SAVING DESIGN FEATURE	8.0	22.2	11.8	5.3	8.0	10.3	-	8.7
EFFICIENCY RATING OF CENTRAL AIR SYSTEM	8.0	11.1	11.8	7.9	4.0	10.3	8.3	4.3
LANDSCAPING	1.3	-	2.0	2.6	-	2.6	-	-
RATED EXTREMELY OR VERY IMPORTANT...								
LOCATION OF SUBDIVISION	94.7	77.8	96.1	94.7	92.0	100.0	83.3	91.3
TOTAL PRICE OF HOUSE	94.7	77.8	96.1	94.7	92.0	100.0	83.3	91.3
BUILDER'S REPUTATION	84.0	88.9	82.4	78.9	88.0	79.5	100.0	82.6
AMOUNT OF MONTHLY PAYMENTS	84.0	88.9	96.1	84.2	72.0	79.5	83.3	91.3
QUALITY OF CONSTRUCTION	65.3	77.8	64.7	63.2	68.0	71.8	66.7	52.2
DOWN PAYMENT REQUIRED	65.3	88.9	82.4	57.9	48.0	53.8	75.0	82.6
INTEREST RATE ON LOAN	60.0	55.6	72.5	63.2	52.0	61.5	50.0	65.2
AMOUNT AND TYPE OF INSULATION	60.0	77.8	66.7	52.6	68.0	61.5	66.7	56.5
ENERGY SAVING DESIGN FEATURE	40.0	66.7	45.1	39.5	40.0	46.2	25.0	39.1
EFFICIENCY RATING OF CENTRAL AIR SYSTEM	29.3	22.2	29.4	31.6	36.0	33.3	16.7	30.4
LANDSCAPING	9.3	11.1	9.8	13.2	4.0	12.8	8.3	4.3
RATED FACTOR UNIMPORTANT...								
LANDSCAPING	60.0	33.3	64.7	57.9	68.0	59.0	58.3	65.2
EFFICIENCY RATING OF CENTRAL AIR SYSTEM	37.3	22.2	37.3	42.1	28.0	33.3	33.3	43.5
ENERGY SAVING DESIGN FEATURE	25.3	11.1	21.6	26.3	20.0	20.5	25.0	30.4
INTEREST RATE ON LOAN	12.0	11.1	5.9	13.2	16.0	5.1	16.7	17.4
AMOUNT AND TYPE OF INSULATION	12.0	-	7.8	7.9	16.0	15.4	-	8.7
DOWN PAYMENT REQUIRED	9.3	-	2.0	7.9	20.0	12.8	8.3	4.3
QUALITY OF CONSTRUCTION	8.0	-	5.9	2.6	8.0	10.3	-	8.7
AMOUNT OF MONTHLY PAYMENTS	4.0	-	-	2.6	12.0	5.1	8.3	-
TOTAL PRICE OF HOUSE	2.7	-	-	2.6	4.0	2.6	-	4.3
BUILDER'S REPUTATION	-	-	-	-	-	-	-	-
LOCATION OF SUBDIVISION	-	-	-	-	-	-	-	-

Section C--Knowledge Component

1. The only factor rated extremely important in conserving energy by more than half the builder sample is insulation of attic and walls (88%). Combining responses of extremely and very important, insulation remains the factor most often cited as very or extremely important in conserving energy. Ventilation of attic space and size, amount, location of window space were considered to be extremely or very important by a large majority of the sample (89% and 84% respectively).
2. Four factors (natural ventilation of rooms, light colored exterior walls, proper lighting design, and window space that can be shaded/exposed) were rated as unimportant in conserving energy by approximately a quarter of the builder sample. Particular attention should be paid to these areas in teaching builders about energy conservation in the design and construction of homes.
3. Builders are uninformed as to the proportion of total energy consumed used to heat, cool, and light homes. Only 9% were close to the correct 15% answer. The average of the percentages given by builders is 35%.
4. Builders generally did well when tested on their knowledge of various energy concepts with the majority of respondents giving the correct answer on all but three of the questions. Only 34% of the builders knew that as the thickness of insulation is increased, you do not get a corresponding and equal reduction in heat loss or gain. Again, only 34% knew that horizontal shading devices protect more efficiently around southern exposures. Builders tend to underestimate the

potential effectiveness of proper lighting design in reducing energy consumption. Only 3% answered correctly that proper lighting design can potentially reduce energy consumption by 50%.

****ENERGY CONSERVATION STUDY****

****BUILDER SAMPLE****

TABLE (C) 1 IMPORTANCE OF FACTORS IN WAYS TO CONSERVE ENERGY

	--BUILD SOME HOUSES--				--HOUSES UNDER--			
	--IN THIS PRICE RANGE--				--CONSTRUCTION--			
	UNDER \$30K- \$50K- \$75K				UNDER 25- 50			
TOTAL	\$30K	\$49K	\$74K	PLUS	25	49	PLUS	
BASE (NUMBER OF RESPONDENTS)	75	9	51	38	25	39	12	23
RATED FACTOR EXTREMELY IMPORTANT...								
INSULATION OF ATTIC AND WALLS	88.0	100.0	92.2	86.8	88.0	89.7	75.0	91.3
VENTILATION OF ATTIC SPACE	48.0	44.4	54.9	47.4	36.0	51.3	41.7	47.8
SIZE,AMOUNT,LOCATION OF WINDOW SPACE	46.7	33.3	52.9	39.5	52.0	46.2	41.7	52.2
BUILDING SHAPED FOR LEAST SUN EXPOSURE	34.7	55.6	39.2	31.6	24.0	25.6	41.7	47.8
SITING OF DWELLING RELATED TO SUN PATH	32.0	11.1	33.3	34.2	32.0	35.9	25.0	26.1
LOCATION OF OUTSIDE VEGETATION	24.0	33.3	29.4	23.7	20.0	23.1	25.0	26.1
LIGHT COLORED ROOF	16.0	44.4	21.6	15.8	4.0	15.4	16.7	17.4
NATURAL VENTILATION OF ROOMS	10.7	-	15.7	7.9	8.0	10.3	16.7	8.7
WINDOW SPACE THAT CAN BE SHADED/EXPOSED	9.3	-	13.7	7.9	16.0	7.7	16.7	8.7
PROPER LIGHTING DESIGN	6.7	-	9.8	7.9	4.0	5.1	8.3	8.7
LIGHT COLORED EXTERIOR WALLS	5.3	11.1	7.8	7.9	-	5.1	-	8.7
RATED FACTOR EXTREMELY/VERY IMPORTANT...								
INSULATION OF ATTIC AND WALLS	97.3	100.0	100.0	97.4	96.0	97.4	91.7	100.0
VENTILATION OF ATTIC SPACE	88.0	100.0	92.2	84.2	88.0	89.7	83.3	87.0
SIZE,AMOUNT,LOCATION OF WINDOW SPACE	84.0	77.8	88.2	78.9	84.0	76.9	91.7	91.3
LOCATION OF OUTSIDE VEGETATION	66.7	66.7	72.5	57.9	68.0	69.2	75.0	56.5
SITING OF DWELLING RELATED TO SUN PATH	65.3	77.8	66.7	65.8	64.0	66.7	58.3	65.2
BUILDING SHAPED FOR LEAST SUN EXPOSURE	65.3	66.7	68.6	65.8	64.0	64.1	66.7	65.2
LIGHT COLORED ROOF	57.3	66.7	58.8	52.8	60.0	56.4	58.3	56.5
PROPER LIGHTING DESIGN	38.7	22.2	39.2	50.0	32.0	38.5	50.0	30.4
WINDOW SPACE THAT CAN BE SHADED/EXPOSED	37.3	44.4	31.4	42.1	48.0	38.5	50.0	30.4
NATURAL VENTILATION OF ROOMS	30.7	-	33.3	36.8	24.0	33.3	33.3	21.7
LIGHT COLORED EXTERIOR WALLS	29.3	33.3	31.4	34.2	32.0	25.6	33.3	30.4
RATED FACTOR UNIMPORTANT...								
NATURAL VENTILATION OF ROOMS	29.3	22.2	25.5	26.3	28.0	25.6	25.0	39.1
LIGHT COLORED EXTERIOR WALLS	25.3	-	23.5	25.7	24.0	25.6	25.0	26.1
WINDOW SPACE THAT CAN BE SHADED/EXPOSED	22.7	-	21.6	26.3	16.0	25.6	16.7	21.7
PROPER LIGHTING DESIGN	21.3	44.4	17.6	15.8	16.0	17.9	25.0	26.1
LIGHT COLORED ROOF	9.3	-	9.8	15.8	8.0	5.1	8.3	17.4
SITING OF DWELLING RELATED TO SUN PATH	9.3	11.1	9.8	5.3	12.0	10.3	16.7	4.3
LOCATION OF OUTSIDE VEGETATION	8.0	-	9.8	10.5	4.0	7.7	-	13.0
BUILDING SHAPED FOR LEAST SUN EXPOSURE	6.7	-	5.9	7.9	12.0	10.3	-	4.3
SIZE,AMOUNT,LOCATION OF WINDOW SPACE	2.7	-	3.9	5.3	-	5.1	-	-
INSULATION OF ATTIC AND WALLS	1.3	-	-	2.6	4.0	-	8.3	-
VENTILATION OF ATTIC SPACE	1.3	-	2.0	-	-	2.6	-	-

****ENERGY CONSERVATION STUDY****

****BUILDER SAMPLE****

TABLE (C) 2 WHAT PROPORTION OF THE TOTAL ENERGY CONSUMED IN THE UNITED STATES EACH YEAR DO YOU ESTIMATE IS USED TO HEAT, COOL, AND LIGHT HOMES

	--BUILD SOME HOUSES--				*--HOUSES UNDER--*			
	--IN THIS PRICE RANGE--				*--CONSTRUCTION--*			
	UNDER \$30K	\$30K- \$49K	\$50K- \$74K	\$75K PLUS	UNDER 25	25- 50	50 PLUS	
BASE (NUMBER OF RESPONDENTS)	75	9	51	38	25	39	12	23
PER CENT OF TOTAL ENERGY CONSUMED...								
1 - 9	2.7	11.1	3.9	-	-	-	8.3	4.3
10 - 19	9.3	11.1	5.9	7.4	16.0	5.1	25.0	8.7
20 - 29	18.7	22.2	19.6	23.7	16.0	15.4	-	34.8
30 - 39	12.0	11.1	9.8	10.5	8.0	17.9	-	4.3
40 - 49	12.0	-	9.8	13.1	20.0	12.8	16.7	8.7
50 - 59	12.0	11.1	13.7	13.2	12.0	12.8	8.3	13.0
60 - 69	8.0	22.3	9.8	7.9	-	2.6	16.7	13.1
70 - 79	2.7	-	3.9	-	-	2.6	-	4.4
80 - 89	1.3	11.1	2.0	-	-	-	8.3	-
90 - 100	-	-	-	-	-	-	-	-
DK/NR	21.3	-	21.6	23.7	28.0	30.8	16.7	8.7
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AVERAGE PER CENT	35.42	39.44	37.63	34.41	30.39	35.67	37.80	34.24

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****ENERGY CONSERVATION STUDY****

****BUILDER SAMPLE****

TABLE (C) 2A KNOWLEDGE ON VARIOUS ENERGY CONCEPTS

	--BUILD SOME HOUSES-- *--IN THIS PRICE RANGE--*				*--HOUSES UNDER--* *--CONSTRUCTION--*			
	UNDER \$30K-	\$30K- \$49K	\$49K- \$74K	\$74K PLUS	UNDER 25-	25- 49	49- 50	50 PLUS
	TOTAL							
BASE (NUMBER OF RESPONDENTS)	75	9	51	38	25	39	12	23
A SINGLE STORY DWELLING USED LESS ENERGY FOR HEATING AND COOLING PER SQUARE FOOT OF AREA THAN A TWO STORY HOUSE.								
AGREE	25.3	33.3	25.5	26.3	20.0	28.2	8.3	30.4
DISAGREE	68.0	55.6	66.7	65.8	80.0	66.7	83.3	60.9
NO OPINION	6.7	11.1	7.8	7.9	-	5.1	8.3	8.7
THE NATURAL COVER OF GROUND TENDS TO STABILIZE TEMPERATURES AND DECREASE EXTREME VARIATION IN TEMPERATURES								
AGREE	77.3	66.7	78.4	81.6	76.0	84.6	66.7	69.6
DISAGREE	16.0	33.3	15.7	10.5	20.0	10.3	25.0	21.7
NO OPINION	6.7	-	5.9	7.9	4.0	5.1	8.3	8.7
FOR PROPER NATURAL VENTILATION, THE POSITION OF THE OPENINGS ON WALLS ARE NOT IMPORTANT								
AGREE	16.0	11.1	15.7	18.4	16.0	15.4	8.3	21.7
DISAGREE	80.0	88.9	80.4	76.3	80.0	82.1	83.3	73.9
NO OPINION	4.0	-	3.9	5.3	4.0	2.6	8.3	4.3
THE EFFECTIVENESS OF A SHADING DEVICE CHANGES ACCORDING TO THE SUN'S POSITION								
AGREE	85.3	88.9	86.3	84.2	80.0	84.6	91.7	82.6
DISAGREE	8.0	11.1	5.9	10.5	12.0	7.7	-	13.0
NO OPINION	6.7	-	7.8	5.3	8.0	7.7	8.3	4.3
A 40 PER CENT REDUCTION IN ENERGY USE CAN BE ACHIEVED BY ADDING SUITABLE CEILING & WALL INSULATION & STORM WINDOW								
AGREE	62.7	66.7	64.7	60.5	68.0	64.1	66.7	60.9
DISAGREE	18.7	22.2	19.6	18.4	16.0	15.4	25.0	21.7
NO OPINION	18.7	11.1	15.7	21.1	16.0	20.5	8.3	17.4

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(CONTINUED PAGE 2)

****ENERGY CONSERVATION STUDY****

****BUILDER SAMPLE****

TABLE (C) 2A KNOWLEDGE ON VARIOUS ENERGY CONCEPTS

	--BUILD SOME HOUSES--				**HOUSES UNDER--*		
	--IN THIS PRICE RANGE--				**CONSTRUCTION--*		
	UNDER \$30K-	\$30K- \$50K-	\$50K- \$75K	PLUS	UNDER 25-	50	PLUS
TOTAL	\$30K	\$49K	\$74K	PLUS	25	49	PLUS
AS THE THICKNESS OF INSULATION IS INCREASED, YOU GET A CORRESPONDING AND EQUAL REDUCTION IN HEAT LOSS OR GAIN							
AGREE	61.3	44.4	60.8	60.5	60.0	71.8	50.0 47.8
DISAGREE	33.3	55.6	33.3	31.6	40.0	23.1	41.7 47.8
NO OPINION	5.3	-	5.9	7.9	-	5.1	8.3 4.3
LIGHT COLORS REFLECT HEAT, DARK COLORS ABSORB HEAT							
AGREE	97.3	100.0	96.1	97.4	100.0	100.0	91.7 95.7
DISAGREE	2.7	-	3.9	2.6	-	-	8.3 4.3
NO OPINION	-	-	-	-	-	-	- -
OUTSIDE SHADING IN THE FORM OF OVERHANGS, SCREEN WALLS, AND AWNINGS ARE APPROX. TWICE AS EFFECTIVE AS INTERIOR SHADING IN THE FORM OF CURTAINS, BLINDS, & SHADES							
AGREE	60.0	55.6	62.7	52.6	68.0	59.0	75.0 52.2
DISAGREE	21.3	44.4	17.6	26.3	12.0	23.1	8.3 26.1
NO OPINION	18.7	-	19.6	21.1	20.0	17.9	16.7 21.7
BUILDING SHAPES HAVE LITTLE OR NO EFFECT ON ENERGY CONSUMPTION FOR BUILDING HEATING AND COOLING							
AGREE	14.7	-	15.7	10.5	12.0	17.9	- 17.4
DISAGREE	82.7	100.0	82.4	84.2	84.0	79.5	91.7 82.6
NO OPINION	2.7	-	2.0	5.3	4.0	2.6	8.3 -

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****ENERGY CONSERVATION STUDY****

****BUILDER SAMPLE****

TABLE (C) 28 KNOWLEDGE ON VARIOUS ENERGY SAVING CONCEPTS

	--BUILD SOME HOUSES--				**HOUSES UNDER--*			
	--IN THIS PRICE RANGE--				**CONSTRUCTION--*			
	UNDER \$30K-	\$30K- \$49K	\$50K- \$74K	\$75K PLUS	UNDER 25-	25- 49	50 PLUS	
TOTAL	\$30K	\$49K	\$74K	PLUS	25	49	PLUS	
BASE (TOTAL RESPONDENTS)	75	9	51	38	25	39	12	23
LIGHT COLORED EXTERIOR SURFACES COMPARED TO DARK SURFACES IN THE SAME EXPOSURE SHOW TEMPERATURES...								
LOWER THAN DARK SURFACES	94.6	100.0	94.1	89.5	100.0	97.4	83.3	95.7
SAME AS DARK SURFACES	-	-	-	-	-	-	-	-
HIGHER THAN DARK SURFACES	2.7	-	2.0	5.2	-	2.6	8.3	-
DON'T KNOW/NO OPINION	2.7	-	3.9	5.3	-	-	8.4	4.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
HORIZONTAL SHADING DEVICES PROTECT MORE EFFICIENTLY AROUND...								
SOUTHERN EXPOSURES	34.7	44.5	29.4	23.7	48.0	38.4	50.0	21.7
NORTHERN EXPOSURES	24.0	22.2	23.5	26.3	28.0	30.8	16.6	13.0
WESTERN EXPOSURES	30.7	33.3	37.3	36.8	12.0	23.1	16.7	52.2
EASTERN EXPOSURES	5.3	-	5.9	5.3	4.0	5.1	-	8.7
DON'T KNOW/NO OPINION	5.3	-	3.9	7.9	8.0	2.6	16.7	4.4
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
VERTICAL SHADING DEVICES PROTECTS WINDOWS OR WALL OPENINGS ORIENTED...								
TOWARD NORTH/SOUTH	18.6	11.1	17.7	26.3	20.0	15.4	8.3	30.4
TOWARD EAST/WEST	66.7	77.8	68.6	60.5	64.0	71.8	66.7	56.5
DON'T KNOW/NO OPINION	14.7	11.1	13.7	13.2	16.0	12.8	25.0	13.1
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
PROPER LIGHTING DESIGN HAS THE POTENTIAL OF REDUCING ENERGY CONSUMPTION FOR LIGHTING BY...								
10 PER CENT	56.0	66.7	56.9	60.5	52.0	53.9	83.3	47.8
30 PER CENT	30.6	33.3	31.4	23.7	32.0	28.2	8.3	43.5
50 PER CENT	2.7	-	3.9	2.6	4.0	5.1	-	-
DON'T KNOW/NO OPINION	10.7	-	7.8	13.2	12.0	12.8	8.4	8.7
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Section D--Concepts

1. Each respondent was asked to evaluate four concept statements describing how energy can be saved in the operation of single-family homes by making design changes.
2. The concept statements are presented at the front of the report.

Concept 1--Shading

1. Builder attitude toward this concept is generally favorable with 70% liking it very much or slightly. However, almost 29% dislike it very much or slightly while only 1% have no opinion.
2. Over half of the sample (55%) believe that this concept would be very or extremely effective in conserving energy.
3. A large majority of builders believe that the concept would increase the total cost of a house. Most builders agree that the concept would decrease summer utility bills but would cause no change or only slightly decrease winter utility bills.

Concept 2--Cross-ventilation

1. Slightly more than half the builders like this concept either very much or slightly. Twenty-eight per cent dislike it and 18% have no opinion.
2. Builders are not very optimistic about the effectiveness of this concept in conserving energy. Only 30% believe it would be very effective in conserving energy while over half responded that it would not be effective.
3. Most builders feel that this concept would increase the total cost of the house only slightly if at all. It was the opinion of most builders that this concept would decrease summer utility bills but would have little effect on winter bills.

Concept 3--Natural Wind Cooling

1. Only slightly more than half of the builder sample like this concept while a third dislike it and 16% have no opinion.
2. Most builders believe that this concept will not be effective in conserving energy.
3. A majority of builders see this concept as increasing the total cost of a house while decreasing summer utility bills slightly. Most think this concept would have no effect on winter utility bills.

Concept 4--Shape of House

1. Fifty-five per cent of builders like this concept but the majority of these only like it slightly. Almost one-fifth are undecided while one-fifth dislike it slightly and only 8% dislike it very much.
2. A large majority (72%) have no opinion as to the effectiveness of this concept in conserving energy. Only 1% have a positive attitude toward the concept's effectiveness.
3. Most builders think that using this concept would actually decrease the total cost of the house. It is felt that this concept would decrease summer utility bills only slightly, if at all, and all builders agree that this concept would cause no change in winter bills.

Over-all Evaluation of Concepts

1. Few builders responded that they would definitely use any of the concepts. Builders seem to be almost evenly divided between using the concept and not using it on the shading, cross-ventilation and shape of house concepts. Most builders would definitely or probably not use the natural wind cooling concept with a third responding that they definitely would not use it. The shading concept appears to be the most popular with only 10% stating they definitely would not use it and over 40% stating they would probably or definitely use it.
2. More builders perceive consumers wanting the shading concept than any of the others and over half of the builders think consumers might want the cross-ventilation concept. Builders perceive the natural wind cooling concept as being the least popular with consumers.
3. Most builders think the natural wind cooling concept would add the most to the cost of a house while the shape of house concept would add the least.
4. Most builders believe that the shading concept would save the most energy while there is little consensus as to which would save the least amount of energy.

TABLE (E) S1 SUMMARY OF CONCEPT OPINIONS

		-----CONCEPT-----			
		1	2	3	4
		-----	-----	-----	-----
BASE (TOTAL RESPONDENTS)		75	75	75	75
OVERALL OPINION OF CONCEPT...	*INDEX*				
LIKE IT VERY MUCH	5	32.0	12.0	14.7	10.7
LIKE IT SLIGHTLY	4	38.7	41.3	37.3	44.0
NO OPINION	3	1.3	17.3	16.0	17.3
DISLIKE IT SLIGHTLY	2	17.3	16.0	17.3	20.0
DISLIKE IT VERY MUCH	1	12.0	13.3	14.7	8.0
TOTAL		101.3	100.0	100.0	100.0
AVERAGE RATING		3.61	3.23	3.20	3.29
EFFECTIVENESS IN CONSERVING ENERGY...					
EXTREMELY	5	5.3	2.7	-	1.3
VERY	4	49.3	29.3	28.0	-
NO OPINION	3	17.3	14.7	13.3	72.0
NOT VERY	2	25.3	46.7	42.7	8.0
NOT AT ALL	1	2.7	6.7	16.0	18.7
TOTAL		100.0	100.0	100.0	100.0
AVERAGE RATING		3.29	2.75	2.53	2.57
INFLUENCE ON TOTAL COST OF HOUSE...					
INCREASE COST	9-6	88.0	36.0	65.3	2.7
CAUSE NO CHANGE	5	5.3	56.0	29.3	37.3
DECREASE COST	4-1	6.7	8.0	5.3	60.0
AVERAGE RATING		6.38	5.41	6.40	4.18
INFLUENCE ON UTILITY BILLS IN SUMMER...					
INCREASE COST	9-6	9.3	8.0	5.3	6.7
CAUSE NO CHANGE	5	10.7	32.0	37.3	49.3
DECREASE COST	4-1	80.0	60.0	57.3	44.0
AVERAGE RATING		3.85	4.21	4.31	4.45
INFLUENCE ON UTILITY BILLS IN WINTER...					
INCREASE COST	9-6	9.3	13.3	13.3	-
CAUSE NO CHANGE	5	52.0	53.3	50.7	100.0
DECREASE COST	4-1	38.7	33.3	36.0	-
AVERAGE RATING		4.56	4.69	4.61	-
••CONCEPT DEFINITIONS••					
CONCEPT 1	SHADING				
CONCEPT 2	CROSS-VENTILATION				
CONCEPT 3	NATURAL WIND COOLING				
CONCEPT 4	SHAPE OF HOUSE				

****ENERGY CONSERVATION STUDY****

****BUILDER SAMPLE****

TABLE (E) 9A CONCEPT YOU FEEL YOUR CUSTOMERS WOULD DEFINITELY LIKE, MIGHT LIKE, OR WOULD DEFINITELY NOT LIKE IN THE NEW HOMES THEY PURCHASE

	--BUILD SOME HOUSES--					*--HOUSES UNDER--*		
	--IN THIS PRICE RANGE--					*--CONSTRUCTION--*		
	UNDER \$30K-	\$30K- \$49K	\$49K- \$74K	\$74K PLUS	UNDER 25-	25- 49	50 PLUS	
TOTAL	30K	49K	74K	PLUS	25	49	PLUS	
-----	-----	-----	-----	-----	-----	-----	-----	
BASE (NUMBER OF RESPONDENTS)	75	9	51	38	25	39	12	23
WOULD LIKE TO HAVE THESE...								
CONCEPT 1 SHADING	40.0	55.6	33.3	39.5	56.0	41.0	16.7	47.8
CONCEPT 4 SHAPE OF HOUSE	24.0	22.2	29.4	26.3	12.0	20.5	25.0	30.4
CONCEPT 2 CROSS-VENTILATION	22.7	22.2	27.5	23.7	16.0	23.1	33.3	13.0
CONCEPT 3 NATURAL WIND COOLING	12.0	11.1	13.7	18.4	12.0	10.3	25.0	8.7
DON'T KNOW	28.0	-	27.5	23.7	28.0	33.3	41.7	13.0
MIGHT LIKE THESE...								
CONCEPT 2 CROSS-VENTILATION	50.7	44.4	52.9	50.0	60.0	53.8	33.3	56.5
CONCEPT 3 NATURAL WIND COOLING	41.3	33.3	47.1	36.8	32.0	43.6	33.3	43.5
CONCEPT 4 SHAPE OF HOUSE	38.7	44.4	37.3	34.2	48.0	41.0	25.0	39.1
CONCEPT 1 SHADING	30.7	33.3	29.4	34.2	24.0	25.6	50.0	30.4
DON'T KNOW	13.3	-	15.7	10.5	16.0	12.8	25.0	8.7
WOULD NOT LIKE THESE...								
CONCEPT 3 NATURAL WIND COOLING	44.0	55.6	35.3	47.4	44.0	43.8	41.7	43.5
CONCEPT 4 SHAPE OF HOUSE	30.7	11.1	27.5	34.2	32.0	33.3	33.3	26.1
CONCEPT 1 SHADING	26.7	11.1	33.3	26.3	16.0	30.8	33.3	17.4
CONCEPT 2 CROSS-VENTILATION	21.3	11.1	15.7	21.1	16.0	20.5	25.0	21.7
DON'T KNOW	24.0	22.2	29.4	15.8	28.0	25.6	25.0	21.7

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****ENERGY CONSERVATION STUDY****

****BUILDER SAMPLE****

TABLE (E) 98 HOW MUCH EACH CONCEPT WOULD ADD TO THE COST OF CONSTRUCTING A NEW HOUSE

		--BUILD SOME HOUSES--				*--HOUSES UNDER--*			
		--IN THIS PRICE RANGE--				*--CONSTRUCTION--*			
		UNDER \$30K-	\$50K-	\$75K	UNDER 25-	50			
TOTAL		\$30K	\$49K	\$74K	PLUS	25	49	PLUS	
		-----	-----	-----	-----	-----	-----	-----	
BASE (NUMBER OF RESPONDENTS)		75	9	51	38	25	39	12	23
CONCEPT THAT WOULD ADD MOST TO COST...									
CONCEPT 3	NATURAL WIND COOLING	57.3	77.8	56.9	57.9	48.0	53.8	58.3	60.9
CONCEPT 1	SHADING	25.3	22.2	21.5	18.4	40.0	23.1	41.7	21.7
CONCEPT 2	CROSS-VENTILATION	5.3	-	5.9	7.9	4.0	10.2	-	-
CONCEPT 4	SHAPE OF HOUSE	2.7	-	3.9	5.3	-	2.6	-	4.3
DON'T KNOW		9.4	-	11.8	10.5	8.0	10.3	-	13.1
TOTAL		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
CONCEPT THAT WOULD ADD LEAST TO COST...									
CONCEPT 4	SHAPE OF HOUSE	50.7	77.8	47.1	44.7	56.0	48.7	58.4	47.8
CONCEPT 2	CROSS-VENTILATION	18.6	22.2	17.6	21.1	4.0	20.5	8.3	21.7
CONCEPT 1	SHADING	12.0	-	13.7	13.2	16.0	12.8	8.3	13.0
CONCEPT 3	NATURAL WIND COOLING	8.0	-	7.9	10.5	16.0	5.1	25.0	4.4
DON'T KNOW		10.7	-	13.7	10.5	8.0	12.9	-	13.1
TOTAL		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

****ENERGY CONSERVATION STUDY****

****BUILDER SAMPLE****

TABLE (E) 9C HOW MUCH EACH CONCEPT WOULD SAVE IN TERMS OF ANNUAL ENERGY CONSUMPTION

		--BUILD SOME HOUSES--				*--HOUSES UNDER--*		
		--IN THIS PRICE RANGE--				*--CONSTRUCTION--*		
		UNDER \$30K- \$30K- \$75K				UNDER 25- 50		
		TOTAL	\$30K	\$49K	\$74K	PLUS	25	49
		-----	-----	-----	-----	-----	-----	-----
BASE (NUMBER OF RESPONDENTS)		75	9	51	38	25	39	12
								23
CONCEPT THAT WOULD SAVE MOST ENERGY...								
CONCEPT 1	SHADING	52.0	77.8	41.2	50.0	68.0	46.2	75.0
CONCEPT 4	SHAPE OF HOUSE	17.3	11.1	23.5	18.4	4.0	17.9	29.0
CONCEPT 2	CROSS-VENTILATION	12.0	-	11.7	15.8	12.0	12.8	-
CONCEPT 3	NATURAL WIND COOLING	9.3	11.1	11.8	7.9	8.0	12.8	-
DON'T KNOW		9.4	-	11.8	7.9	8.0	10.3	-
TOTAL		100.0	100.0	100.0	100.0	100.0	100.0	100.0
CONCEPT THAT WOULD SAVE LEAST ENERGY...								
CONCEPT 3	NATURAL WIND COOLING	28.0	33.3	27.5	23.7	32.0	23.1	41.7
CONCEPT 4	SHAPE OF HOUSE	28.0	44.5	25.5	34.2	28.0	30.8	8.3
CONCEPT 2	CROSS-VENTILATION	17.3	11.1	13.7	13.2	16.0	12.8	41.7
CONCEPT 1	SHADING	16.0	11.1	19.6	21.0	16.0	20.3	8.3
DON'T KNOW		10.7	-	13.7	7.9	8.0	12.8	-
TOTAL		100.0	100.0	100.0	100.0	100.0	100.0	100.0

••ENERGY CONSERVATION STUDY••

••BUILDER SAMPLE••

TABLE (E) S2 PROBABILITY OF USING THIS CONCEPT IN SOME HOUSES YOU WILL BUILD IN NEXT

		-----CONCEPT-----			
		1	2	3	4
		-----	-----	-----	-----
BASE (NUMBER OF RESPONDENTS)		75	75	75	75
PROBABILITY OF USING CONCEPT...	*INDEX*				
DEFINITELY USE IT	3	21.3	17.3	6.7	20.0
PROBABLY USE IT	4	22.7	24.0	13.3	22.7
NO OPINION	3	14.7	10.7	17.3	13.3
PROBABLY NOT USE IT	2	32.0	29.3	29.3	28.0
DEFINITELY NOT USE IT	1	9.3	18.7	33.4	16.0
TOTAL		100.0	100.0	100.0	100.0
AVERAGE RATING		3.15	2.92	2.31	3.03

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••CONCEPT DEFINITIONS••

CONCEPT 1 SHADING
 CONCEPT 2 CROSS-VENTILATION
 CONCEPT 3 NATURAL WIND COOLING
 CONCEPT 4 SHAPE OF HOUSE

Section E--Written Training Instructions and Sales Brochures
Related to Energy Saving Features of Homes Sold By
Builders

1. Seven out of ten builders report that they now discuss energy saving features of their new homes either in advertising or personal sales presentations made to prospective home buyers.
2. But a majority of these builders (68%) do not provide written instructions to sales people to help them explain the advantages of the energy saving features of their new homes.
3. An even larger majority of these builders (75%) do not have any brochures telling about the energy saving features of their new homes to give to prospective new home buyers.
4. Builders were almost equally divided as to whether or not the advertising message "We spent an extra \$1,000 in construction cost to make this home 25 per cent more efficient in its use of energy for heating, cooling, and lighting" would be effective.

NOTE: It may be encouraging that 48% of the builders think that there is a concern among consumers for energy saving even if the initial outlay for the house is increased.

****ENERGY CONSERVATION STUDY****

****BUILDER SAMPLE****

TABLE (B) 4C/D DO YOU HAVE WRITTEN TRAINING INSTRUCTIONS FOR YOUR SALES PEOPLE TO HELP THEM EXPLAIN THE ADVANTAGES OF THE ENERGY SAVING FEATURES OF YOUR NEW HOMES

DO YOU HAVE ANY BROCHURES TELLING ABOUT THE ENERGY SAVING FEATURES OF YOUR NEW HOMES TO GIVE TO PROSPECTIVE NEW HOME BUYERS

		--BUILD SOME HOUSES--				*--HOUSES UNDER--*		
		--IN THIS PRICE RANGE--				*--CONSTRUCTION--*		
		UNDER \$30K-	\$30K- \$49K	\$49K- \$74K	\$74K PLUS	UNDER 25-	25- 49	50 PLUS
TOTAL		93	7	40	26	15	28	8 16
BASE (DISCUSS ENERGY SAVING FEATURES TO PROSPECTIVE BUYERS)								
HAVE WRITTEN TRAINING INSTRUCTIONS...								
YES		32.1	57.1	35.0	23.1	46.7	14.3	37.5 36.3
NO		67.9	42.9	65.0	76.9	53.3	85.7	62.5 43.8
TOTAL		100.0	100.0	100.0	100.0	100.0	100.0	100.0
HAVE PRINTED BROCHURES...								
YES		24.5	14.3	30.0	19.2	26.7	14.3	50.0 31.3
NO		75.5	85.7	70.0	80.8	73.3	85.7	50.0 68.8
TOTAL		100.0	100.0	100.0	100.0	100.0	100.0	100.0

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****ENERGY CONSERVATION STUDY****

****BUILDER SAMPLE****

TABLE (B) 5A HOW EFFECTIVE DO YOU FEEL THIS ADVERTISING MESSAGE WOULD BE IN HELPING PERSUADE NEW-HOME SHOPPERS TO BUY ONE OF YOUR HOMES--- WE SPENT AN EXTRA \$1,000 IN CONSTRUCTION COST TO MAKE THIS HOME 25 PER CENT MORE EFFICIENT IN ITS USE OF ENERGY FOR HEATING, COOLING, AND LIGHTING.

	--BUILD SOME HOUSES--				*--HOUSES UNDER--*			
	--IN THIS PRICE RANGE--				*--CONSTRUCTION--*			
	UNDER \$30K-	\$30K- \$49K	\$50K- \$74K	\$75K PLUS	UNDER 25-	25- 49	50 PLUS	
TOTAL	\$30K	\$49K	\$74K	PLUS	25	49	PLUS	
BASE 1 DISCUSS ENERGY SAVING FEATURES TO PROSPECTIVE BUYERS)	53	7	40	26	15	28	8	16
THIS ADVERTISING MESSAGE WOULD BE...								
EXTREMELY EFFECTIVE	9.4	14.3	10.0	3.8	13.3	14.3	-	6.2
VERY EFFECTIVE	37.7	42.8	42.5	30.8	53.3	39.3	25.0	43.7
NOT VERY EFFECTIVE	35.9	42.9	32.5	53.8	20.0	32.1	50.0	37.5
NOT AT ALL EFFECTIVE	11.3	-	10.0	7.7	13.4	7.1	25.0	6.3
NO OPINION	5.7	-	5.0	3.9	-	7.2	-	6.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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Section F--Builders' Source of Energy Saving Information

1. The most important regular source of information concerning planning, design and construction of single-family dwellings for builders is trade publications. In terms of regular or occasional sources, salemen and manufacturer's representatives are most important to most builders with trade publications, talking with other builders, talking with architects and trade shows following closely in importance.
2. The only building publications read regularly or occasionally by the majority of builders are Professional Builder and NAHB Journal of Homebuilding.
3. The only architecture publication regularly or occasionally read by most builders is House & Home. Most builders do read Better Homes and Gardens and Southern Living.

****ENERGY CONSERVATION STUDY****

****BUILDER SAMPLE****

TABLE (E) 1A WHERE BUILDERS GET INFORMATION CONCERNING PLANNING, DESIGN, AND CONSTRUCTION OF SINGLE-FAMILY DWELLINGS

	--BUILD SOME HOUSES--				*--HOUSES UNDER--*			
	--IN THIS PRICE RANGE--				*--CONSTRUCTION--*			
	UNDER \$30K	\$30K- \$49K	\$50K- \$74K	\$75K PLUS	UNDER 25	25- 49	50 PLUS	
	TOTAL							
BASE (TOTAL RESPONDENTS)	75	9	51	38	25	39	12	23
TRADE SHOWS...								
REGULARLY	32.0	44.4	37.3	26.3	28.0	28.2	33.3	34.8
OCCASIONALLY	48.0	44.4	47.1	55.3	48.0	41.0	66.7	52.2
NEVER	20.0	11.1	15.7	18.4	24.0	30.8	-	13.0
TRADE PUBLICATIONS...								
REGULARLY	45.3	55.6	52.9	39.5	44.0	41.0	41.7	52.2
OCCASIONALLY	38.7	33.3	37.3	42.1	36.0	35.9	50.0	39.1
NEVER	16.0	11.1	9.8	18.4	20.0	23.1	8.3	8.7
TALKING WITH OTHER BUILDERS...								
REGULARLY	41.3	44.4	41.2	47.4	40.0	48.7	41.7	26.1
OCCASIONALLY	41.3	33.3	43.1	34.2	44.0	38.5	41.7	47.8
NEVER	17.3	22.2	15.7	18.4	16.0	12.8	16.7	26.1
SALESMEN/MANUFACTURERS REPS...								
REGULARLY	42.7	44.4	43.1	44.7	44.0	43.6	33.3	43.5
OCCASIONALLY	44.0	44.4	45.1	39.5	48.0	38.5	66.7	43.5
NEVER	13.3	11.1	11.8	15.8	8.0	17.9	-	13.0
TALKING WITH ARCHITECTS...								
REGULARLY	52.0	22.2	52.9	47.4	64.0	56.4	41.7	52.2
OCCASIONALLY	29.3	44.4	29.4	34.2	24.0	28.2	33.3	30.4
NEVER	18.7	33.3	17.6	18.4	12.0	15.4	25.0	17.4
CONSULTANTS...								
REGULARLY	2.7	-	2.0	5.3	-	2.6	-	4.3
OCCASIONALLY	41.3	55.6	47.1	39.5	40.0	46.2	33.3	39.1
NEVER	56.0	44.4	51.0	55.3	60.0	51.3	66.7	56.5
GOVERNMENT AGENCIES (EPA, HUD, ETC.)...								
REGULARLY	9.3	22.2	13.7	5.3	-	-	25.0	17.4
OCCASIONALLY	28.0	33.3	37.3	26.3	20.0	28.2	25.0	30.4
NEVER	62.7	44.4	49.0	68.4	80.0	71.8	50.0	52.2
SEMINARS/WORKSHOPS...								
REGULARLY	16.0	11.1	21.6	18.4	16.0	12.8	33.3	13.0
OCCASIONALLY	46.7	66.7	51.0	39.5	40.0	41.0	41.7	56.5
NEVER	37.3	22.2	27.5	42.1	44.0	46.2	25.0	30.4
MONTHLY ASSOCIATION MEETINGS...								
REGULARLY	29.3	22.2	39.2	31.6	20.0	23.1	25.0	39.1
OCCASIONALLY	34.7	33.3	29.4	20.9	52.0	33.3	66.7	21.7
NEVER	36.0	44.4	31.4	39.5	28.0	43.6	8.3	39.1

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****ENERGY CONSERVATION STUDY****

****BUILDER SAMPLE****

TABLE 1E) 2.1 BUILDING PUBLICATION READERSHIP

	--BUILD SOME HOUSES-- *--IN THIS PRICE RANGE--*				*--HOUSES UNDER--* *--CONSTRUCTION--*			
	TOTAL	UNDER \$30K	\$30K- \$49K	\$49K- \$74K	\$74K PLUS	UNDER 25	25- 49	50 PLUS
BASE (TOTAL RESPONDENTS)	75	9	51	38	25	39	12	23
BUILDING PUBLICATIONS								
BUILDING DESIGN & CONSTRUCTION...								
REGULARLY	13.3	33.3	15.7	10.5	20.0	7.7	23.0	17.4
OCCASIONALLY	22.7	22.2	27.5	34.2	12.0	23.6	8.3	26.1
NEVER	64.0	44.4	56.9	55.3	68.0	66.7	66.7	56.5
NAHB JOURNAL OF HOMEBUILDING...								
REGULARLY	49.3	55.6	58.8	47.4	52.0	43.6	58.3	52.2
OCCASIONALLY	26.7	33.3	23.5	26.3	24.0	28.2	25.0	26.1
NEVER	24.0	11.1	17.6	26.3	24.0	28.2	16.7	21.7
PROFESSIONAL BUILDER...								
REGULARLY	60.0	88.9	64.7	50.0	72.0	51.3	66.7	73.9
OCCASIONALLY	17.3	-	11.8	23.7	8.0	20.5	25.0	4.3
NEVER	22.7	11.1	23.5	26.3	20.0	28.2	8.3	21.7
BUILDERS JOURNAL...								
REGULARLY	16.0	11.1	23.5	10.5	20.0	7.7	50.0	13.0
OCCASIONALLY	18.7	22.2	17.6	21.1	16.0	15.4	-	34.8
NEVER	65.3	66.7	58.8	68.4	64.0	76.9	50.0	52.2
BUILDING NEWS...								
REGULARLY	8.0	-	11.8	10.5	8.0	2.6	16.7	13.0
OCCASIONALLY	17.3	33.3	23.5	18.4	4.0	12.8	8.3	30.4
NEVER	74.7	66.7	64.7	71.1	88.0	84.6	75.0	56.5
JOURNAL OF HOUSING...								
REGULARLY	4.0	11.1	5.9	5.3	-	2.6	8.3	4.3
OCCASIONALLY	9.3	-	9.8	15.8	4.0	12.8	-	8.7
NEVER	86.7	88.9	84.3	78.9	96.0	84.6	91.7	87.0
RESIDENTIAL BUILDING...								
REGULARLY	8.0	-	7.8	10.5	16.0	5.1	8.3	13.0
OCCASIONALLY	16.0	-	15.7	23.7	12.0	15.4	16.7	17.4
NEVER	76.0	100.0	76.5	65.8	72.0	79.5	75.0	69.6

TABLE 1E1 2.2 ARCHITECTURE AND CONSUMER PUBLICATION READERSHIP

	••--BUILD SOME HOUSES--•• ••--IN THIS PRICE RANGE--•• UNDER \$30K- \$30K- \$75K PLUS					••--HOUSES UNDER--•• ••--CONSTRUCTION--•• UNDER 25- 50 PLUS		
	TOTAL	\$30K	\$49K	\$74K	PLUS	25	49	PLUS
BASE (TOTAL RESPONDENTS)	75	9	51	38	25	39	12	23
•ARCHITECTURE PUBLICATIONS•								
HOUSE & HOME...								
REGULARLY	32.0	33.3	35.3	34.2	24.0	25.6	41.7	39.1
OCCASIONALLY	28.0	44.4	21.6	34.2	28.0	33.3	25.0	21.7
NEVER	40.0	22.2	43.1	31.6	48.0	41.0	33.3	39.1
BUILDING DESIGN & CONSTRUCTION...								
REGULARLY	6.7	11.1	9.8	5.3	8.0	5.1	-	13.0
OCCASIONALLY	22.7	33.3	27.5	26.3	12.0	17.9	16.7	34.8
NEVER	70.7	55.6	62.7	68.4	80.0	76.9	83.3	52.2
PROGRESSIVE ARCHITECTURE...								
REGULARLY	2.7	-	2.0	-	8.0	2.6	-	4.3
OCCASIONALLY	16.0	44.4	11.8	15.8	20.0	12.8	25.0	17.4
NEVER	81.3	55.6	86.3	84.2	72.0	84.6	75.0	78.3
DESIGN & ENVIRONMENT...								
REGULARLY	1.3	-	2.0	-	4.0	-	-	4.3
OCCASIONALLY	6.7	-	5.9	7.9	12.0	5.1	-	13.0
NEVER	92.0	100.0	92.2	92.1	84.0	94.9	100.0	82.6
TEXAS ARCHITECT...								
REGULARLY	1.3	11.1	2.0	-	-	-	-	4.3
OCCASIONALLY	8.0	11.1	5.9	7.9	12.0	5.1	8.3	13.0
NEVER	90.7	77.8	92.2	92.1	88.0	94.9	91.7	82.6
•CONSUMER PUBLICATIONS•								
BETTER HOMES & GARDENS...								
REGULARLY	44.0	33.3	32.9	36.8	52.0	43.6	66.7	34.8
OCCASIONALLY	37.3	55.6	29.4	42.1	32.0	35.9	33.3	39.1
NEVER	20.0	11.1	19.6	21.1	16.0	20.5	-	30.4
SOUTHERN LIVING...								
REGULARLY	37.3	44.4	47.1	31.6	36.0	35.9	50.0	34.8
OCCASIONALLY	32.0	44.4	25.5	34.2	24.0	33.3	33.3	26.1
NEVER	32.0	11.1	29.4	34.2	40.0	30.8	16.7	43.5
HOUSTON HOME & GARDEN...								
REGULARLY	16.0	11.1	15.7	13.2	28.0	17.9	25.0	8.7
OCCASIONALLY	22.7	33.3	23.5	23.7	20.0	30.8	8.3	17.4
NEVER	61.3	55.6	60.8	63.2	52.0	51.3	66.7	73.9

****ENERGY CONSERVATION STUDY****

****BUILDER SAMPLE****

TABLE 1E1 2.2 ARCHITECTURE AND CONSUMER PUBLICATION READERSHIP

	--BUILD SOME HOUSES-- *--IN THIS PRICE RANGE--* UNDER \$30K- \$50K- \$75K PLUS					*--HOUSES UNDER--* *--CONSTRUCTION--* UNDER 25- 50 PLUS		
	TOTAL	\$30K	\$49K	\$74K	PLUS	25	49	PLUS
BASE (TOTAL RESPONDENTS)	75	9	51	38	25	39	12	23
ARCHITECTURE PUBLICATIONS								
HOUSE & HOME...								
REGULARLY	32.0	33.3	35.3	34.2	24.0	25.6	41.7	39.1
OCCASIONALLY	28.0	44.4	21.6	34.2	28.0	33.3	25.0	21.7
NEVER	40.0	22.2	43.1	31.6	48.0	41.0	33.3	39.1
BUILDING DESIGN & CONSTRUCTION...								
REGULARLY	6.7	11.1	9.8	5.3	8.0	5.1	-	13.0
OCCASIONALLY	22.7	33.3	27.5	26.3	12.0	17.9	16.7	34.8
NEVER	70.7	55.6	62.7	68.4	80.0	76.9	83.3	52.2
PROGRESSIVE ARCHITECTURE...								
REGULARLY	2.7	-	2.0	-	8.0	2.6	-	4.3
OCCASIONALLY	16.0	44.4	11.8	15.8	20.0	12.8	25.0	17.4
NEVER	81.3	55.6	86.3	84.2	72.0	84.6	75.0	78.3
DESIGN & ENVIRONMENT...								
REGULARLY	1.3	-	2.0	-	4.0	-	-	4.3
OCCASIONALLY	6.7	-	5.9	7.9	12.0	5.1	-	13.0
NEVER	92.0	100.0	92.2	92.1	84.0	94.9	100.0	82.6
TEXAS ARCHITECT...								
REGULARLY	1.3	11.1	2.0	-	-	-	-	4.3
OCCASIONALLY	8.0	11.1	5.9	7.9	12.0	5.1	8.3	13.0
NEVER	90.7	77.8	92.2	92.1	88.0	94.9	91.7	82.6
CONSUMER PUBLICATIONS								
BETTER HOMES & GARDENS...								
REGULARLY	44.0	33.3	52.9	36.8	52.0	43.6	66.7	34.8
OCCASIONALLY	37.3	55.6	29.4	42.1	32.0	35.9	33.3	39.1
NEVER	20.0	11.1	19.6	21.1	16.0	20.5	-	30.4
SOUTHERN LIVING...								
REGULARLY	37.3	44.4	47.1	31.6	36.0	35.9	50.0	34.8
OCCASIONALLY	32.0	44.4	25.5	34.2	24.0	33.3	33.3	26.1
NEVER	32.0	11.1	29.4	34.2	40.0	30.8	16.7	43.5
HOUSTON HOME & GARDEN...								
REGULARLY	16.0	11.1	15.7	13.2	28.0	17.9	25.0	8.7
OCCASIONALLY	22.7	33.3	23.5	23.7	20.0	30.8	8.3	17.4
NEVER	61.3	55.6	60.8	63.2	52.0	51.3	66.7	73.9

Section G--Convention/Seminar/Workshop Attendance

1. Over half of the builders sampled have attended three or more National Home Builders' Conventions in the past five years with 22% attending all five conventions.
2. A third of the sample of builders have not attended any seminars or workshops concerning subjects related to the design, construction and/or marketing of single-family dwellings during the past five years. However the average number of seminars or workshops attended by builders is slightly more than three in the past five years. The vast majority of seminars/workshops attended lasted a full day or a half day or less.
3. Most seminars/workshops attended were in the same city but a third were in cities 200-299 miles away and another third were in cities 300 or more miles away. Popular months for attending seminars/workshops are January (58%), October (19%), and February (17%).
4. When asked if they would be interested in attending a one-day workshop held in their city on energy conservation ideas in the design and construction of single-family dwellings and their acceptance by new home buyers and the financial community, a total of 31% of the builders indicated that they would be extremely interested and another 35% stated that they would be very interested. Only about 9% indicated that they were not at all interested. This high degree of interest is most encouraging; but in projecting actual attendance, one should evaluate the behavior of the builders in their attendance at seminars and workshops in the past.

****ENERGY CONSERVATION STUDY****

****BUILDER SAMPLE****

TABLE 1E) 4 FREQUENCY OF ATTENDING THE NATIONAL HOME BUILDERS' CONVENTION IN THE PAST FIVE YEARS

	--BUILD SOME HOUSES--				*--HOUSES UNDER--*			
	--IN THIS PRICE RANGE--				*--CONSTRUCTION--*			
	UNDER \$30K-	\$50K-	\$75K		UNDER 25-	50		
	TOTAL	\$30K	\$49K	\$74K	PLUS	25	49	PLUS
BASE (NUMBER OF RESPONDENTS)	75	9	51	38	25	39	12	23
TIMES ATTENDED IN PAST 5 YEARS...								
NONE	9.3	-	9.8	5.3	12.0	10.3	8.3	8.7
1	10.7	-	9.8	18.4	8.0	12.8	-	13.1
2	21.3	33.3	19.6	21.0	16.0	33.3	8.3	8.7
3	24.0	22.2	25.5	23.7	20.0	15.4	41.7	30.4
4	13.3	11.1	11.8	18.4	16.0	12.8	8.3	17.4
5	21.4	33.4	23.5	13.2	28.0	15.4	33.4	21.7
6	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-
9 OR MORE	-	-	-	-	-	-	-	-
DK/NR	-	-	-	-	-	-	-	-
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AVERAGE NUMBER OF TIMES	2.85	3.44	2.90	2.71	3.04	2.54	3.42	3.00

****ENERGY CONSERVATION STUDY****

****BUILDER SAMPLE****

TABLE (E) 5 SUMMARY OF ATTENDING SEMINARS OR WORKSHOPS CONCERNING SUBJECTS RELATED TO THE DESIGN, CONSTRUCTION, AND/OR MARKETING OF SINGLE-FAMILY DWELLINGS DURING PAST 5 YEARS

	--BUILD SOME HOUSES--				*--HOUSES UNDER--*			
	--IN THIS PRICE RANGE--				*--CONSTRUCTION--*			
	UNDER \$30K-	\$50K-	\$75K	PLUS	UNDER 25-	50	PLUS	
	TOTAL	\$30K	\$49K	\$74K	PLUS	25	49	PLUS
BASE (NUMBER OF RESPONDENTS)	75	9	51	38	25	39	12	23
TIMES ATTENDED IN PAST 5 YEARS...								
NONE	34.7	33.3	29.4	34.2	32.0	48.7	25.0	17.4
1	6.7	-	3.9	7.9	8.0	7.7	-	4.3
2	13.3	22.2	11.8	15.8	8.0	12.8	16.7	13.0
3	9.3	-	11.8	7.9	12.0	-	8.3	26.1
4	5.3	11.1	7.8	5.3	4.0	2.6	-	13.0
5	8.0	-	7.8	10.5	12.0	12.8	-	4.3
6	1.3	-	2.0	-	-	-	-	4.4
7	1.3	-	2.0	2.6	-	-	-	4.4
8	2.7	-	3.9	-	8.0	2.6	8.3	-
9 OR MORE	16.0	33.4	17.6	15.8	16.0	10.2	41.7	13.1
DK/NR	1.4	-	2.0	-	-	2.6	-	-
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AVERAGE NUMBER OF TIMES	3.09	3.89	3.56	2.97	3.44	2.26	5.00	3.57
BASE (ATTENDED MEETINGS IN PAST 5 YEARS)	48	6	35	25	17	19	9	19
SEMINAR/WORK SHOP LASTED...								
HALF DAY OR LESS	66.7	83.3	57.1	76.0	52.9	63.2	77.8	63.2
FULL DAY	37.5	50.0	42.9	44.0	29.4	42.1	33.3	36.8
2 DAYS	16.7	16.7	20.0	16.0	23.5	5.3	44.4	15.8
3 DAYS	14.6	-	17.1	20.0	17.6	21.1	22.2	5.3
4 DAYS	-	-	-	-	-	-	-	-
5 OR MORE DAYS	-	-	-	-	-	-	-	-
DK/NR	-	-	-	-	-	-	-	-
TOTAL	135.4	150.0	137.1	156.0	123.5	131.6	177.8	121.1

(CONTINUED)

••ENERGY CONSERVATION STUDY••

••BUILDER SAMPLE••

TABLE (E) 5 SUMMARY OF ATTENDING SEMINARS OR WORKSHOPS CONCERNING SUBJECTS RELATED TO THE DESIGN, CONSTRUCTION, AND/OR MARKETING OF SINGLE-FAMILY DWELLINGS DURING PAST 5 YEARS

	---BUILD SOME HOUSES--- *--IN THIS PRICE RANGE-- UNDER \$30K- \$50K- \$75K				*--HOUSES UNDER--- *--CONSTRUCTION--- UNDER 25- 50 PLUS			
	TOTAL	\$30K	\$49K	\$74K	PLUS	25	49	PLUS
BASE (NUMBER OF RESPONDENTS)	75	9	51	38	25	39	12	23
TIMES ATTENDED IN PAST 5 YEARS...								
NONE	34.7	33.3	29.4	34.2	32.0	48.7	25.0	17.4
1	6.7	-	3.9	7.9	8.0	7.7	-	4.3
2	13.3	22.2	11.8	15.8	8.0	12.8	16.7	13.0
3	9.3	-	11.8	7.9	12.0	-	8.3	26.1
4	5.3	11.1	7.8	5.3	4.0	2.6	-	13.0
5	8.0	-	7.8	10.5	12.0	12.8	-	4.3
6	1.3	-	2.0	-	-	-	-	4.4
7	1.3	-	2.0	2.6	-	-	-	4.4
8	2.7	-	3.9	-	8.0	2.6	8.3	-
9 OR MORE	16.0	33.4	17.6	15.8	16.0	10.2	41.7	13.1
DK/NR	1.4	-	2.0	-	-	2.6	-	-
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
•AVERAGE NUMBER OF TIMES•	3.09	3.89	3.56	2.97	3.44	2.26	5.00	3.57
BASE (ATTENDED MEETINGS IN PAST 5 YEARS)	48	6	35	25	17	19	9	19
SEMINAR/WORK SHOP LASTED...								
HALF DAY OR LESS	66.7	83.3	57.1	76.0	52.9	63.2	77.8	63.2
FULL DAY	37.5	50.0	42.9	44.0	29.4	42.1	33.3	36.8
2 DAYS	16.7	16.7	20.0	16.0	23.5	5.3	44.4	15.8
3 DAYS	14.6	-	17.1	20.0	17.6	21.1	22.2	5.3
4 DAYS	-	-	-	-	-	-	-	-
5 OR MORE DAYS	-	-	-	-	-	-	-	-
DK/NR	-	-	-	-	-	-	-	-
TOTAL	135.4	150.0	137.1	156.0	123.5	131.6	177.8	121.1

(CONTINUED)

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ENERGY CONSERVATION STUDY

BUILDER SAMPLE

TABLE (E) 5 SUMMARY OF ATTENDING SEMINARS OR WORKSHOPS CONCERNING SUBJECTS RELATED TO THE DESIGN, CONSTRUCTION, AND/OR MARKETING OF SINGLE-FAMILY DWELLINGS DURING PAST 5 YEARS

	--BUILD SOME HOUSES--				*-HOUSES UNDER--*		
	-IN THIS PRICE RANGE--				*-CONSTRUCTION--*		
	UNDER \$30K-	\$30K- \$49K	\$49K \$74K	\$74K PLUS	UNDER 25-	25- 49	50 PLUS
TOTAL	\$30K	\$49K	\$74K	PLUS	25	49	PLUS
DISTANCE TRAVELED TO ATTEND...							
IN SAME CITY	66.7	83.3	65.7	68.0	58.8	52.6	77.8
50 - 99 MILES	12.5	-	17.1	16.0	5.9	21.1	22.2
100 - 149 MILES	4.2	-	5.7	8.0	-	5.3	11.1
150 - 199 MILES	10.4	-	8.6	16.0	11.8	10.5	11.1
200 - 299 MILES	31.3	50.0	31.4	40.0	23.5	42.1	22.2
300 OR MORE MILES	29.2	33.3	28.6	28.0	35.3	36.8	33.3
DK/NR	2.1	-	2.9	4.0	-	-	-
TOTAL	156.3	166.7	160.0	180.0	135.3	168.4	177.8
ATTENDED DURING THESE MONTHS...							
JAN	58.3	83.3	60.0	64.0	52.9	57.9	55.6
FEB	16.7	33.3	20.0	12.0	11.8	5.3	11.1
MAR	6.3	-	8.6	4.0	11.8	-	22.2
APR	12.5	-	11.4	4.0	23.5	15.8	22.2
MAY	8.3	16.7	8.6	8.0	11.8	-	22.2
JUN	12.5	16.7	14.3	12.0	17.6	10.5	22.2
JUL	12.5	16.7	17.1	4.0	17.6	10.5	22.2
AUG	10.4	-	11.4	12.0	5.9	15.8	11.1
SEP	12.5	-	14.3	8.0	11.8	10.5	22.2
OCT	18.8	33.3	20.0	24.0	17.6	26.3	11.1
NOV	14.6	16.7	20.0	16.0	11.8	10.5	22.2
DEC	2.1	-	2.9	4.0	-	-	11.1
DK/NR	16.7	16.7	20.0	8.0	29.4	-	44.4
TOTAL	202.1	233.3	228.6	180.0	223.5	163.2	300.0

TABLE E-6A DEGREE OF INTEREST IN ATTENDING A ONE-DAY WORKSHOP HELD IN THIS CITY
ON ENERGY CONSERVATION IDEAS IN THE DESIGN AND CONSTRUCTION OF SINGLE-FAMILY DWELLINGS
AND THEIR ACCEPTANCE BY NEW HOME BUYERS AND THE FINANCIAL COMMUNITY

	--BUILD SOME HOUSES--				*--HOUSES UNDER--*			
	--IN THIS PRICE RANGE--				*--CONSTRUCTION--*			
	UNDER \$30K-	\$50K-	\$75K	PLUS	UNDER 25-	50	PLUS	
TOTAL	\$30K	\$49K	\$74K	PLUS	25	49	PLUS	
BASE (TOTAL RESPONDENTS)	75	9	51	38	25	39	12	23
DEGREE OF INTEREST IN ATTENDING...								
INTERESTED--EXTREMELY	30.6	44.5	37.2	31.6	20.0	23.1	33.3	43.5
INTERESTED--VERY	34.6	33.3	31.4	34.2	40.0	35.9	41.7	26.1
INTERESTED--SLIGHTLY	22.7	11.1	23.5	26.3	24.0	20.5	25.0	26.1
UNINTERESTED--SLIGHTLY	2.7	11.1	2.0	2.6	4.0	5.1	-	-
UNINTERESTED--VERY	2.7	-	3.9	-	-	2.6	-	4.3
UNINTERESTED--EXTREMELY	4.0	-	-	2.6	8.0	7.7	-	-
NO OPINION GIVEN	2.7	-	2.0	2.7	4.0	5.1	-	-
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Comparative Analysis of Builder and
Consumer Sub-Samples

PREFACE

The following is a brief report of the comparative findings of our consumer and builder sub-samples. The consumer sub-sample consists of 100 respondents from Southeast and South Central, Texas, while the builder sub-sample contains 75 respondents from the same geographic area. The findings from the survey data are exploratory, and are designed to provide greater insights into understanding the respective sub-sample's feelings regarding the energy shortage, and more specifically, their knowledge and attitudes with respect to energy conservation in residential home construction.

Section A--Energy Shortage

1. The vast majority of both consumers and builders (74% and 69% respectively) believe an energy shortage exists in the U.S. today.
2. In terms of factors contributing to our energy shortage, 85% of our consumer sub-sample and 80% of our builder sub-sample perceive consumer wastefulness as an extremely or very important factor in contributing to our energy shortage. Interestingly, a significantly larger proportion of consumers attach importance to dwindling fuel supplies as a cause of the energy shortage than do builders (82% vs. 67%).
3. As a source of energy savings, a slightly higher percentage of the consumer sub-sample (39%) see residential dwellings as extremely important compared to 29% in the builder sub-sample. When combining the extremely and very important categories, a substantial majority of both consumers and builders (78% and 71% respectively) see residential dwellings as a source of energy savings. Compared with other potential sources of energy savings in terms of proportion of responses, both rank residential dwellings fourth--below manufacturing plants, commercial buildings, and autos.

TABLE (A) 3 IMPORTANCE OF FACTORS AS A POTENTIAL SOURCE OF ENERGY SAVINGS

	CONS- UMER	BUIL- DER
	-----	-----
BASE (FEEL THERE IS AN ENERGY SHORTAGE)	74	53
RATED FACTOR EXTREMELY IMPORTANT...		
MANUFACTURING PLANTS	64.9	49.1
COMMERCIAL BUILDINGS	56.8	49.1
AUTOMOBILES	52.7	50.9
RESIDENTIAL DWELLINGS	39.2	28.3
RECYCLING OF PACKAGING & CONTAINERS	36.5	32.1
APPLIANCES	24.3	9.4
RATED EXTREMELY/VERY IMPORTANT...		
COMMERCIAL BUILDINGS	85.1	81.1
AUTOMOBILES	83.8	88.7
MANUFACTURING PLANTS	83.8	86.8
RESIDENTIAL DWELLINGS	78.4	71.7
RECYCLING OF PACKAGING & CONTAINERS	66.2	60.4
APPLIANCES	55.4	39.6
RATED UNIMPORTANT...		
APPLIANCES	10.8	13.2
RECYCLING OF PACKAGING & CONTAINERS	6.8	13.2
COMMERCIAL BUILDINGS	3.4	3.8
AUTOMOBILES	4.1	-
RESIDENTIAL DWELLINGS	4.1	1.9
MANUFACTURING PLANTS	4.1	1.9

TABLE (A) 2 IMPORTANCE OF FACTORS IN CAUSING OR CONTRIBUTING TO THE ENERGY SHORTAGE

	CONS- UMER	BUIL- DER
	-----	-----
BASE (FEEL THERE IS AN ENERGY SHORTAGE)	74	53
RATED FACTOR EXTREMELY IMPORTANT...		
CITIZENS HAVE BEEN WASTEFUL	55.4	41.5
WORLD RUNNING OUT OF FUEL SUPPLIES	54.1	35.8
AMERICAN AUTOMAKERS	47.3	37.7
WASTE OF ENERGY IN DESIGN AND OPERATION OF HOMES	40.5	26.4
EFFORTS OF ENVIRONMENTALISTS TO PREVENT POLLUTION	36.5	11.3
RATED EXTREMELY/VERY IMPORTANT...		
WORLD RUNNING OUT OF FUEL SUPPLIES	82.4	67.9
EFFORTS OF ENVIRONMENTALISTS TO PREVENT POLLUTION	66.2	41.5
WASTE OF ENERGY IN DESIGN AND OPERATION OF HOMES	78.4	67.9
CITIZENS HAVE BEEN WASTEFUL	85.1	77.4
AMERICAN AUTOMAKERS	71.6	69.8
RATED UNIMPORTANT...		
EFFORTS OF ENVIRONMENTALISTS TO PREVENT POLLUTION	14.9	20.8
AMERICAN AUTOMAKERS	6.8	1.9
WASTE OF ENERGY IN DESIGN AND OPERATION OF HOMES	5.4	5.7
CITIZENS HAVE BEEN WASTEFUL	5.4	1.9
WORLD RUNNING OUT OF FUEL SUPPLIES	4.1	3.8

Section B--Purchase of Home

1. Whereas 24% of our consumer sub-sample considered energy saving design features an extremely important factor in the decision to purchase a new home, only 8% of the builders believed consumers considered this factor extremely important. When combining the extremely and very important responses, substantially more consumers (61%) perceive this factor to be important whereas only 40% of the builders believe consumers consider this factor important. In summary, builders substantially underestimate the importance of this factor to consumers. Conversely, they substantially overestimate the importance of builder's reputation to consumers.
2. It should be noted that if energy saving design features is ranked on the basis of the percentage of extremely important responses, it ranks tenth out of eleven for both consumers and builders. If the extremely important and very important responses are combined, the ranks are eighth and ninth, respectively. Hence, while the percentages differ significantly among these sub-samples, the rankings do not.
3. Interestingly, while only 9% of the consumer sub-sample perceived the efficiency of central air system as unimportant in the purchase decision process, 37% of the builder sub-sample believed consumers would consider this factor unimportant.
4. More consumers believe energy conservation to be an important factor in the purchase of a new home than builders believe. Consequently, an educational program for builders seems warranted.

TABLE B-2 IMPORTANCE OF FACTORS IN DECISION TO PURCHASE NEW HOME

	CONS- UMER -----	BUIL- DER -----
BASE (NUMBER OF RESPONDENTS)	100	75
RATED FACTOR EXTREMELY IMPORTANT...		
QUALITY OF CONSTRUCTION	60.0	30.7
LOCATION OF SUBDIVISION	52.0	56.0
TOTAL PRICE OF HOUSE	51.0	40.0
AMOUNT AND TYPE OF INSULATION	51.0	26.7
INTEREST RATE ON LOAN	49.0	20.0
AMOUNT OF MONTHLY PAYMENTS	41.0	53.3
EFFICIENCY RATING OF CENTRAL AIR SYSTEM	35.0	8.0
BUILDER'S REPUTATION	33.0	54.7
DOWN PAYMENT REQUIRED	29.0	25.3
ENERGY SAVING DESIGN FEATURE	24.0	8.0
LANDSCAPING	21.0	1.3
RATED EXTREMELY OR VERY IMPORTANT...		
QUALITY OF CONSTRUCTION	91.0	65.3
LOCATION OF SUBDIVISION	89.0	94.7
TOTAL PRICE OF HOUSE	84.0	94.7
AMOUNT AND TYPE OF INSULATION	78.0	60.0
INTEREST RATE ON LOAN	77.0	60.0
AMOUNT OF MONTHLY PAYMENTS	68.0	84.0
EFFICIENCY RATING OF CENTRAL AIR SYSTEM	68.0	29.3
ENERGY SAVING DESIGN FEATURE	61.0	40.0
DOWN PAYMENT REQUIRED	55.0	65.3
BUILDER'S REPUTATION	54.0	84.0
LANDSCAPING	44.0	9.3
RATED FACTOR UNIMPORTANT...		
LANDSCAPING	29.0	60.0
BUILDER'S REPUTATION	20.0	-
ENERGY SAVING DESIGN FEATURE	19.0	25.3
DOWN PAYMENT REQUIRED	18.0	9.3
AMOUNT OF MONTHLY PAYMENTS	13.0	4.0
EFFICIENCY RATING OF CENTRAL AIR SYSTEM	9.0	37.3
INTEREST RATE ON LOAN	8.0	12.0
TOTAL PRICE OF HOUSE	5.0	2.7
AMOUNT AND TYPE OF INSULATION	5.0	12.0
LOCATION OF SUBDIVISION	4.0	-
QUALITY OF CONSTRUCTION	3.0	8.0

Section C--Knowledge Component

1. In terms of ways to conserve energy in residential dwellings, substantial agreement exists among both sub-samples with respect to importance of ventilation, insulation, size, amount and location of window space, etc. However, a higher proportion of respondents in the consumer sub-sample than in the builder sub-sample perceive the following as either extremely or very important: lighting design-77% vs. 38%; natural ventilation of rooms-69% vs. 32%; and shaded and exposed window space-68% vs. 37%. Conversely, as one might expect, substantially more builders than consumers rate these same factors unimportant.

2. On the eleven item test about knowledge of various energy concepts, builders, surprisingly, perform no better than consumers. In fact, on questions 2, 5, 8, 11, and 13, builders tend to be slightly more incorrect than consumers. Only on question 1, 6, and 10 are the aggregate responses of builders better than those of consumers.

3. When asked what proportion of the total energy is used to heat, cool, and light homes, both sub-samples substantially overestimated the actual figure.

Note: These findings would seem to confirm the need for an educational workshop on energy conservation for builders.

****ENERGY CONSERVATION STUDY****

****CONSUMER SAMPLE--PURCHASED HOME PAST YEAR****

TABLE C1 IMPORTANCE OF FACTORS IN WAYS TO CONSERVE ENERGY

	CONS- UMER -----	BUIL- DER -----
BASE (NUMBER OF RESPONDENTS)	100	75
RATED FACTOR EXTREMELY IMPORTANT...		
INSULATION OF ATTIC AND WALLS	89.0	88.0
VENTILATION OF ATTIC SPACE	63.0	48.0
SIZE,AMOUNT,LOCATION OF WINDOW SPACE	55.0	46.7
PROPER LIGHTING DESIGN	43.0	6.7
LOCATION OF OUTSIDE VEGETATION	38.0	24.0
SITING OF DWELLING RELATED TO SUN PATH	34.0	32.0
WINDOW SPACE THAT CAN BE SHADED/EXPOS	30.0	9.3
NATURAL VENTILATION OF ROOMS	29.0	10.7
LIGHT COLORED ROOF	22.0	16.0
LIGHT COLORED EXTERIOR WALLS	17.0	5.3
BUILDING SHAPED FOR LEAST SUN EXPOSURE	16.0	34.7
RATED FACTOR EXTREMELY/VERY IMPORTANT...		
INSULATION OF ATTIC AND WALLS	99.0	97.3
VENTILATION OF ATTIC SPACE	94.0	88.0
SIZE,AMOUNT,LOCATION OF WINDOW SPACE	87.0	84.0
PROPER LIGHTING DESIGN	77.0	38.7
LOCATION OF OUTSIDE VEGETATION	75.0	66.7
SITING OF DWELLING RELATED TO SUN PATH	69.0	65.3
NATURAL VENTILATION OF ROOMS	69.0	30.7
WINDOW SPACE THAT CAN BE SHADED/EXPOS	68.0	37.3
BUILDING SHAPED FOR LEAST SUN EXPOSURE	57.0	65.3
LIGHT COLORED ROOF	56.0	57.3
LIGHT COLORED EXTERIOR WALLS	45.0	29.3
RATED FACTOR UNIMPORTANT...		
LIGHT COLORED EXTERIOR WALLS	15.0	25.3
BUILDING SHAPED FOR LEAST SUN EXPOSURE	13.0	6.7
LIGHT COLORED ROOF	11.0	9.3
SITING OF DWELLING RELATED TO SUN PATH	10.0	9.3
NATURAL VENTILATION OF ROOMS	8.0	29.3
PROPER LIGHTING DESIGN	6.0	21.3
LOCATION OF OUTSIDE VEGETATION	6.0	8.0
WINDOW SPACE THAT CAN BE SHADED/EXPOS	4.0	22.7
INSULATION OF ATTIC AND WALLS	-	1.3
SIZE,AMOUNT,LOCATION OF WINDOW SPACE	-	2.7
VENTILATION OF ATTIC SPACE	-	1.3

TABLE (C) 2A KNOWLEDGE ON VARIOUS ENERGY CONCEPTS

	CONS- UMER	BUIL- DER
	-----	-----
BASE (NUMBER OF RESPONDENTS)	100	75
A SINGLE STORY DWELLING USED LESS ENERGY FOR HEATING AND COOLING PER SQUARE FOOT OF AREA THAN A TWO STORY HOUSE.		
AGREE	61.0	25.3
DISAGREE	28.0	68.0
NO OPINION	11.0	6.7
THE NATURAL COVER OF GROUND TENDS TO STABILIZE TEMPERATURES AND DECREASE EXTREME VARIATION IN TEMPERATURES		
AGREE	76.0	77.3
DISAGREE	12.0	16.0
NO OPINION	12.0	6.7
FOR PROPER NATURAL VENTILATION, THE POSITION OF THE OPENINGS ON WALLS ARE NOT IMPORTANT		
AGREE	8.0	16.0
DISAGREE	82.0	80.0
NO OPINION	10.0	4.0
THE EFFECTIVENESS OF A SHADING DEVICE CHANGES ACCORDING TO THE SUN'S POSITION		
AGREE	90.0	85.3
DISAGREE	7.0	8.0
NO OPINION	3.0	6.7
A 40 PER CENT REDUCTION IN ENERGY USE CAN BE ACHIEVED BY ADDING SUITABLE CEILING & WALL INSULATION & STORM WINDOW		
AGREE	75.0	62.7
DISAGREE	10.0	18.7
NO OPINION	15.0	18.7

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****ENERGY CONSERVATION STUDY****

****CONSUMER SAMPLE--PURCHASED HOME PAST YEAR****

TABLE (C) 2A KNOWLEDGE ON VARIOUS ENERGY CONCEPTS

	CONS- UMER -----	BUIL- DER -----
AS THE THICKNESS OF INSULATION IS INCREASED, YOU GET A CORRESPONDING AND EQUAL REDUCTION IN HEAT LOSS OR GAIN		
AGREE	73.0	61.3
DISAGREE	18.0	33.3
NO OPINION	9.0	5.3
LIGHT COLORS REFLECT HEAT, DARK COLORS ABSORB HEAT		
AGREE	93.0	97.3
DISAGREE	6.0	2.7
NO OPINION	1.0	-
OUTSIDE SHADING IN THE FORM OF OVERHANGS, SCREEN WALLS, AND AWNINGS ARE APPROX. TWICE AS EFFECTIVE AS INTERIOR SHADING IN THE FORM OF CURTAINS, BLINDS, & SHADES		
AGREE	57.0	60.0
DISAGREE	8.0	21.3
NO OPINION	35.0	18.7
BUILDING SHAPES HAVE LITTLE OR NO EFFECT ON ENERGY CONSUMPTION FOR BUILDING HEATING AND COOLING		
AGREE	11.0	14.7
DISAGREE	76.0	82.7
NO OPINION	13.0	2.7

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TABLE 1C1 2B KNOWLEDGE ON VARIOUS ENERGY SAVING CONCEPTS

	CONSUMER	BUILDER
	-----	-----
BASE (TOTAL RESPONDENTS)	100	75
LIGHT COLORED EXTERIOR SURFACES COMPARED TO DARK SURFACES IN THE SAME EXPOSURE SHOW TEMPERATURES...		
LOWER THAN DARK SURFACES	86.0	94.6
SAME AS DARK SURFACES	1.0	-
HIGHER THAN DARK SURFACES	12.0	2.7
DON'T KNOW/NO OPINION	1.0	2.7
TOTAL	100.0	100.0
HORIZONTAL SHADING DEVICES PROTECT MORE EFFICIENTLY AROUND...		
SOUTHERN EXPOSURES	38.0	34.7
NORTHERN EXPOSURES	33.0	24.0
WESTERN EXPOSURES	8.0	30.7
EASTERN EXPOSURES	9.0	5.3
DON'T KNOW/NO OPINION	12.0	5.3
TOTAL	100.0	100.0
VERTICAL SHADING DEVICES PROTECTS WINDOWS OR WALL OPENINGS ORIENTED...		
TOWARD NORTH/SOUTH	25.0	18.6
TOWARD EAST/WEST	62.0	66.7
DON'T KNOW/NO OPINION	13.0	14.7
TOTAL	100.0	100.0
PROPER LIGHTING DESIGN HAS THE POTENTIAL OF REDUCING ENERGY CONSUMPTION FOR LIGHTING BY...		
10 PER CENT	36.0	56.0
30 PER CENT	48.0	30.6
50 PER CENT	13.0	2.7
DON'T KNOW/NO OPINION	3.0	10.7
TOTAL	100.0	100.0

****ENERGY CONSERVATION STUDY****

****CONSUMER SAMPLE--PURCHASED HOME PAST YEAR****

TABLE (C) 2 WHAT PROPORTION OF THE TOTAL ENERGY CONSUMED IN THE UNITED STATES EACH YEAR DO YOU ESTIMATE IS USED TO HEAT, COOL, AND LIGHT HOMES

	CONS- UMER	BUIL- DER
	-----	-----
BASE (NUMBER OF RESPONDENTS)	100	75
PER CENT OF TOTAL ENERGY CONSUMED...		
1 - 9	-	2.7
10 - 19	4.0	9.3
20 - 29	15.0	18.7
30 - 39	22.0	12.0
40 - 49	11.0	12.0
50 - 59	16.0	12.0
60 - 69	9.0	8.0
70 - 79	10.0	2.7
80 - 89	6.0	1.3
90 - 100	1.0	-
DK/HR	6.0	21.3
TOTAL	100.0	100.0
 AVERAGE PER CENT	 44.26	 35.42

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Section D--Concepts

1. In terms of whether respondents would definitely like the concepts tested to be incorporated in their next new home, a greater portion of consumers respond more positively to all of these concepts than builders believe they do. While 34% of the consumer sub-sample like the concept of cross-ventilation, only 22% of the builder sub-sample perceive they would. Similarly builder perceptions of the consumer feelings about natural wind cooling tend to substantially underestimate their actual feelings. On the other hand, builder perceptions of consumer feelings with respect to shading and housing shape are quite accurate. It should be noted that a majority of neither sub-sample definitely would incorporate any of these concepts in their next new home, although the shading concept has the most appeal for substantial minorities (approximately 40%) in both sub-samples.
2. When asked whether they might like these concepts (notice: no commitment), a greater percentage of consumers, with the exception of shading, appear willing to consider these concepts. Further, builder assessments of consumer desires tend to correspond more closely.
3. A minority (ranging from 17-34%) of the consumer sub-sample do not like all of the concepts, with slightly more than 1/3 opposing the concept of house shape (partly, I suspect a result of the concept drawing). Ironically, the builder sub-sample perceives that the strongest consumer opposition exists with respect to natural wind cooling which, I suspect, more accurately reflects their own feelings rather than those of consumers.

4. With respect to how much each concept would add to the cost of a new house, a large minority of the consumer sub-sample (44%) see shading as costing the most while a smaller minority (23%) see natural wind cooling as costing the most. In the builder sub-sample, the order is reversed. A slight majority of builders (56%) believe natural wind cooling to be the most costly concept while a smaller minority (26%) see shading as the most costly concept. The differences in feelings between the two sub-samples might be attributed to the loss of control over the number of units in a development that natural wind cooling, at least, implies for builders (Note: If this belief is strongly held by builders and anchored to more central attitude clusters, no amount of information with respect to energy conservation may change that attitude.) Conversely, both groups agree that housing shape is the least costly concept (39% and 50% respectively). (Once again, this may be a function of the concept drawing). While 20% of the respondents in the consumer sub-sample ranked natural cooling as the next least costly concept, only 8% of the builder sub-sample did so. Builders (19%) perceived cross ventilation as the next least costly concept behind shading.

5. In terms of the annual energy consumption savings derived from each of the concepts, both consumers and builders agreed that shading would save the most energy (40% and 53% respectively). Similarly, both groups agreed that housing shape would save the least energy (33% and 29% respectively). The same percentage of builders (29%) also believed wind cooling to be deficient in conserving energy.

****ENERGY CONSERVATION STUDY****

TABLE E1 SUMMARY OF CONCEPT OPINIONS

		CONSUMER SAMPLE				**BUILDER SAMPLE**			
		-----CONCEPT-----				-----CONCEPT-----			
		1	2	3	4	1	2	3	4
		-----	-----	-----	-----	-----	-----	-----	-----
BASE (TOTAL RESPONDENTS)		100	100	100	100	75	75	75	75
OVERALL OPINION OF CONCEPT...		*INDEX*							
LIKE IT VERY MUCH	5	36.0	38.0	28.0	24.0	32.0	12.0	14.7	10.7
LIKE IT SLIGHTLY	4	39.0	40.0	42.0	42.0	38.7	41.3	37.3	44.0
NO OPINION	3	6.0	10.0	12.0	16.0	1.3	17.3	16.0	17.3
DISLIKE IT SLIGHTLY	2	12.0	8.0	11.0	12.0	17.3	16.0	17.3	20.0
DISLIKE IT VERY MUCH	1	7.0	4.0	7.0	6.0	12.0	13.3	14.7	8.0
TOTAL		100.0	100.0	100.0	100.0	101.3	100.0	100.0	100.0
AVERAGE RATING		3.85	4.00	3.73	3.66	3.61	3.23	3.20	3.29
EFFECTIVENESS IN CONSERVING ENERGY...									
EXTREMELY	5	24.0	18.0	11.0	11.0	5.3	2.7	-	1.3
VERY	4	54.0	44.0	44.0	37.0	49.3	29.3	28.0	-
NO OPINION	3	4.0	10.0	12.0	20.0	17.3	14.7	13.3	72.0
NOT VERY	2	18.0	25.0	28.0	28.0	25.3	46.7	42.7	8.0
NOT AT ALL	1	-	3.0	5.0	4.0	2.7	6.7	16.0	18.7
TOTAL		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AVERAGE RATING		3.84	3.49	3.28	3.23	3.29	2.75	2.53	2.57
INFLUENCE ON TOTAL COST OF HOUSE...									
INCREASE COST	9-6	72.0	35.0	38.0	31.0	88.0	36.0	65.3	2.7
CAUSE NO CHANGE	5	15.0	53.0	56.0	49.0	5.3	56.0	29.3	37.3
DECREASE COST	4-1	13.0	12.0	6.0	20.0	6.7	8.0	5.3	60.0
AVERAGE RATING		6.02	5.38	5.68	5.19	6.38	5.41	6.40	4.18
INFLUENCE ON UTILITY BILLS IN SUMMER...									
INCREASE COST	9-6	11.0	9.0	9.0	9.0	9.3	8.0	5.3	6.7
CAUSE NO CHANGE	5	5.0	25.0	31.0	37.0	10.7	32.0	37.3	49.3
DECREASE COST	4-1	84.0	66.0	60.0	54.0	80.0	60.0	57.3	44.0
AVERAGE RATING		3.77	3.87	4.10	4.33	3.85	4.21	4.31	4.45
INFLUENCE ON UTILITY BILLS IN WINTER...									
INCREASE COST	9-6	21.0	25.0	26.0	17.0	9.3	13.3	13.3	-
CAUSE NO CHANGE	5	31.0	42.0	51.0	42.0	52.0	53.3	50.7	100.0
DECREASE COST	4-1	48.0	33.0	23.0	41.0	38.7	33.3	36.0	-
AVERAGE RATING		4.65	4.89	5.06	4.68	4.56	4.69	4.61	-

****CONCEPT DEFINITIONS****

CONCEPT 1 SHADING
 CONCEPT 2 CROSS-VENTILATION
 CONCEPT 3 NATURAL WIND COOLING
 CONCEPT 4 SHAPE OF HOUSE

••ENERGY CONSERVATION STUDY••

••CONSUMER SAMPLE--PURCHASED HOME PAST YEAR••

TABLE E8 CONCEPT YOU WOULD DEFINITELY MIGHT LIKE, OR WOULD DEFINITELY NOT LIKE IN YOUR NEXT NEW HOME

		ANS- MER	BUIL- DER
		-----	-----
BASE (NUMBER OF RESPONDENTS)		100	75
WOULD LIKE TO HAVE THESE...			
CONCEPT 1	SHADING	41.0	40.0
CONCEPT 2	CROSS-VENTILATION	34.0	22.7
CONCEPT 4	SHAPE OF HOUSE	27.0	24.0
CONCEPT 3	NATURAL WIND COOLING	21.0	12.0
DON'T KNOW		19.0	28.0
MIGHT LIKE THESE...			
CONCEPT 3	NATURAL WIND COOLING	47.0	41.3
CONCEPT 2	CROSS-VENTILATION	39.0	50.7
CONCEPT 4	SHAPE OF HOUSE	33.0	38.7
CONCEPT 1	SHADING	30.0	30.7
DON'T KNOW		14.0	13.3
WOULD NOT LIKE THESE...			
CONCEPT 4	SHAPE OF HOUSE	34.0	30.7
CONCEPT 3	NATURAL WIND COOLING	28.0	44.0
CONCEPT 1	SHADING	27.0	26.7
CONCEPT 2	CROSS-VENTILATION	17.0	21.3
DON'T KNOW		27.0	24.0

013

••ENERGY CONSERVATION STUDY••

••CONSUMER SAMPLE--PURCHASED HOME PAST YEAR••

TABLE E9 HOW MUCH EACH CONCEPT WOULD ADD TO THE COST OF CONSTRUCTING A NEW HOUSE

	CONS- UMER	BUIL- DER
	-----	-----
BASE (NUMBER OF RESPONDENTS)	100	75
CONCEPT THAT WOULD ADD MOST TO COST...		
CONCEPT 1 SHADING	44.0	25.3
CONCEPT 3 NATURAL WIND COOLING	23.0	37.3
CONCEPT 2 CROSS-VENTILATION	15.0	5.3
CONCEPT 4 SHAPE OF HOUSE	14.0	2.7
DON'T KNOW	4.0	9.4
TOTAL	100.0	100.0
CONCEPT THAT WOULD ADD LEAST TO COST...		
CONCEPT 4 SHAPE OF HOUSE	39.0	30.7
CONCEPT 3 NATURAL WIND COOLING	20.0	8.0
CONCEPT 1 SHADING	18.0	12.0
CONCEPT 2 CROSS-VENTILATION	17.0	18.6
DON'T KNOW	6.0	10.7
TOTAL	100.0	100.0

••ENERGY CONSERVATION STUDY••

••CONSUMER SAMPLE--PURCHASED HOME PAST YEAR••

TABLE E10 HOW MUCH EACH CONCEPT WOULD SAVE IN TERMS OF ANNUAL ENERGY CONSUMPTION

		CONS- UMER -----	BUIL- DER -----
BASE (NUMBER OF RESPONDENTS)		100	75
CONCEPT THAT WOULD SAVE MOST ENERGY...			
CONCEPT 1	SHADING	40.0	52.0
CONCEPT 2	CROSS-VENTILATION	23.0	12.0
CONCEPT 3	NATURAL WIND COOLING	20.0	9.3
CONCEPT 4	SHAPE OF HOUSE	14.0	17.3
DON'T KNOW		3.0	9.4
TOTAL		100.0	100.0
CONCEPT THAT WOULD SAVE LEAST ENERGY...			
CONCEPT 4	SHAPE OF HOUSE	33.0	28.0
CONCEPT 3	NATURAL WIND COOLING	23.0	28.0
CONCEPT 2	CROSS-VENTILATION	22.0	17.3
CONCEPT 1	SHADING	18.0	16.0
DON'T KNOW		4.0	10.7
TOTAL		100.0	100.0

015

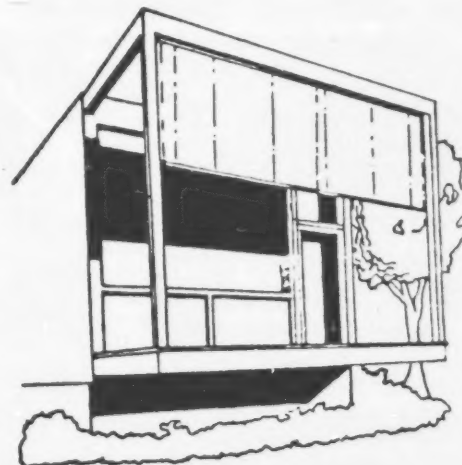
Summary

1. In general, the task of educating, sensitizing and getting builders to yield to the adoption of techniques which conserve energy in residential dwellings is a formidable one. When compared to consumers, fewer believe there is an energy shortage, and many don't see residential dwellings as a potential source of energy savings. Most builders, in our sample, tend to believe that consumers attach little or no importance to energy savings design features. Surprisingly, their knowledge about energy conservation appears to be no better than that demonstrated by consumers. Further, builders tend to perceive consumers as less positive about the energy saving concepts than consumers actually are.
2. Thus, while the task of educating is formidable, it appears to be necessary. Whether we can get them to yield to some or all of our messages on energy conservation is, at this time, problematical. It seems that builders are, first and foremost, pragmatists. If we can convince them that (a) Homes that conserve energy are saleable, i. e., a target market exists which is growing in size, (b) The costs associated with incorporating these concepts in their homes are nominal, (c) Life-cycle costs are a better measure to use than initial costs because houses that conserve energy offer them a means of differentiating their product, and (d) Our suggestions do not violate existing housing codes, we have a chance of changing their attitudes and altering their behavior in time.

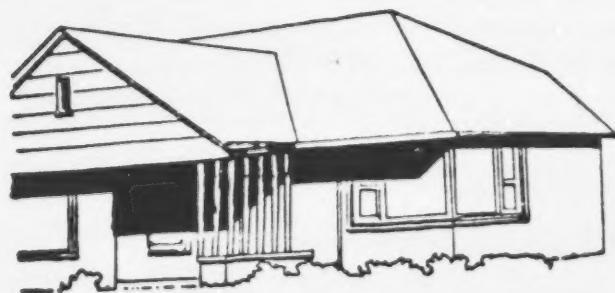
Ordinary glass pane which is used in homes is a poor heat barrier. One square foot of glass pane transmits 30 times more heat than one square foot of wall when exposed to sun. If the glass is shaded it transmits only 12 times more heat than a wall which is in shade. In order to conserve energy it is absolutely necessary that all glass areas exposed to sun be shaded. Southern exposures need horizontal shading devices and western and eastern exposures need vertical shading devices.



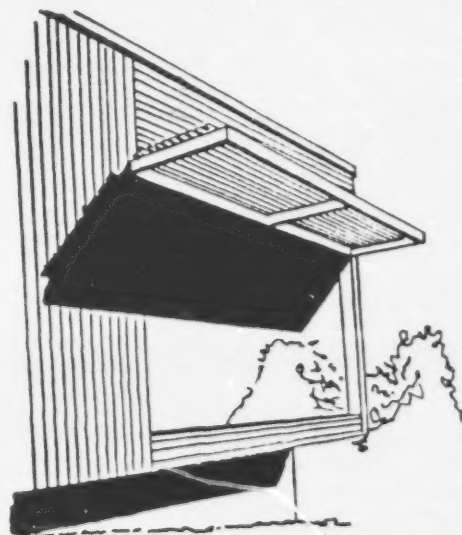
Canvas awning provides shade for glass areas on south side.



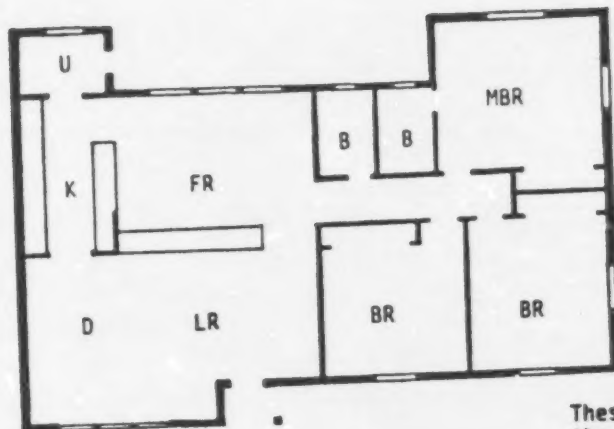
A movable canvas awning provides shade for glass area having western exposure.



Roof overhand provides shade for southern exposure.

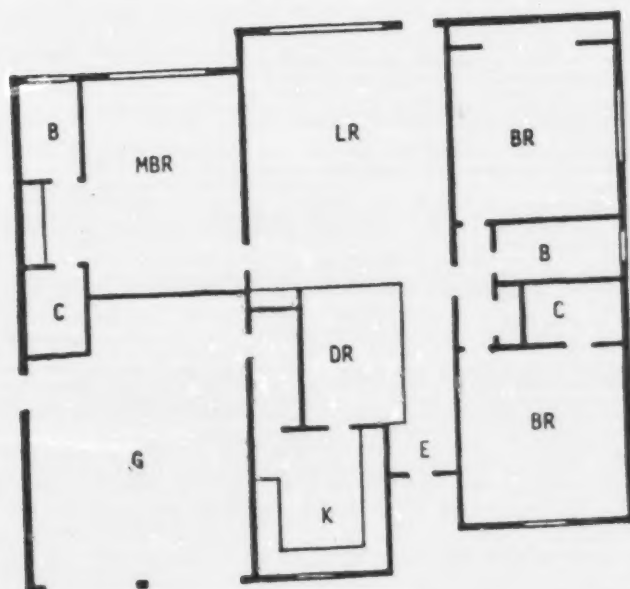
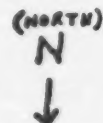
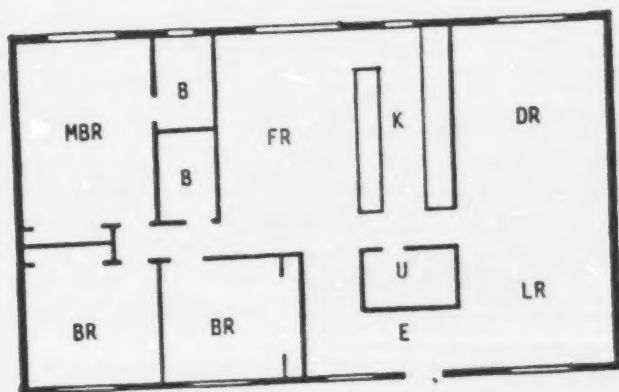


Wooden slats cut out part of sun's heat from glass areas on southside.



Provision for flow of breeze through the house in hot, humid climate, especially when the outside conditions are comfortable (temperature 70-80°F. and relative humidity 30-70%), can reduce energy consumption by shutting off mechanical air-conditioning.

These plans permit cross-ventilation through the living areas by opening the windows on the windward side and leeward (opposite to windward) side.



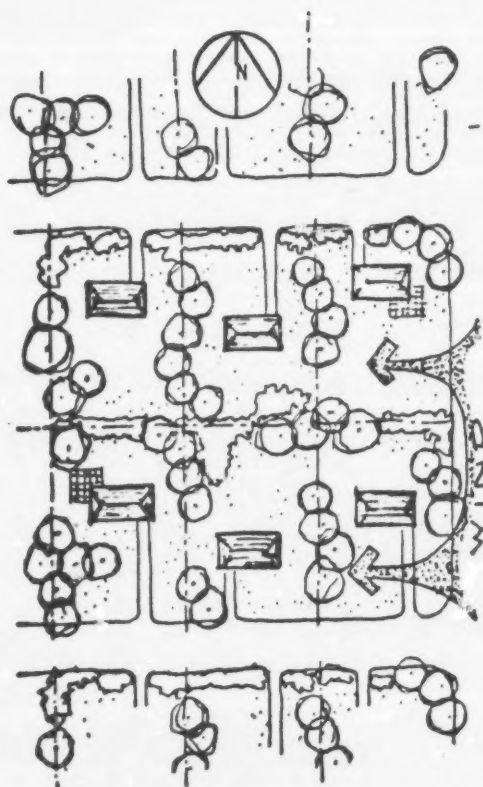
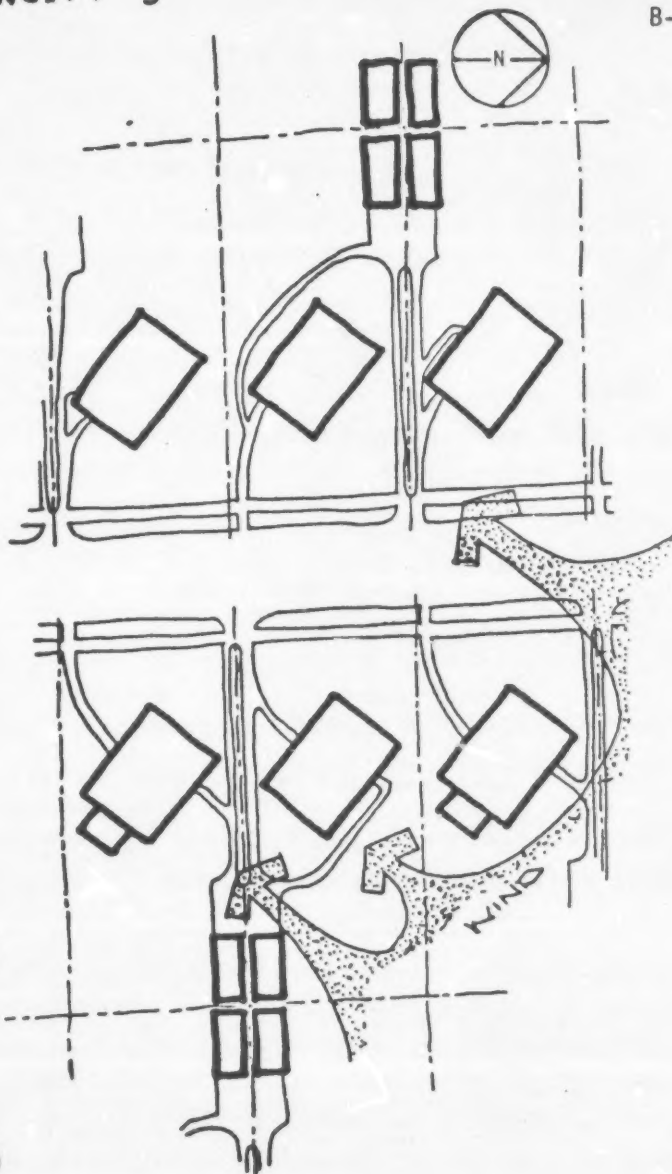
This plan relies more heavily on mechanical air-conditioning. Provisions for cross-ventilation is minimum.

CONCEPT 3

B-62

In a hot and humid climate cross-ventilation is essential for human comfort in the absence of air conditioning. When the outside temperature and relative humidity is within the comfort zone, considerable energy can be saved by allowing movement of breeze through the house and shutting off mechanical air conditioning.

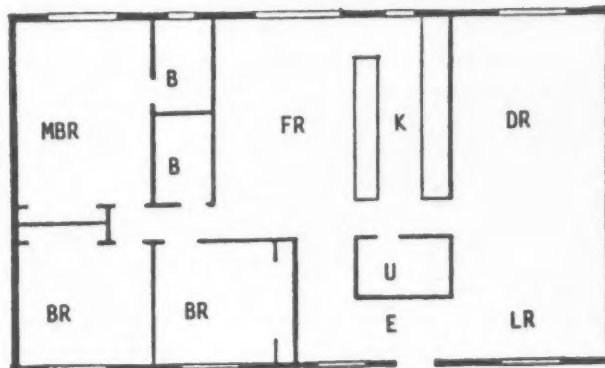
This site plan has best orientation for prevailing winds and therefore would allow breeze to flow through the house. Furthermore, the plan does not create wind shadow for subsequent units.



In this plan homes are air conditioned, and are oriented on the lot so that they will receive maximum cooling from the wind and minimum heat from the sun. Wind blowing parallel to the building carries away heat from the building surface.

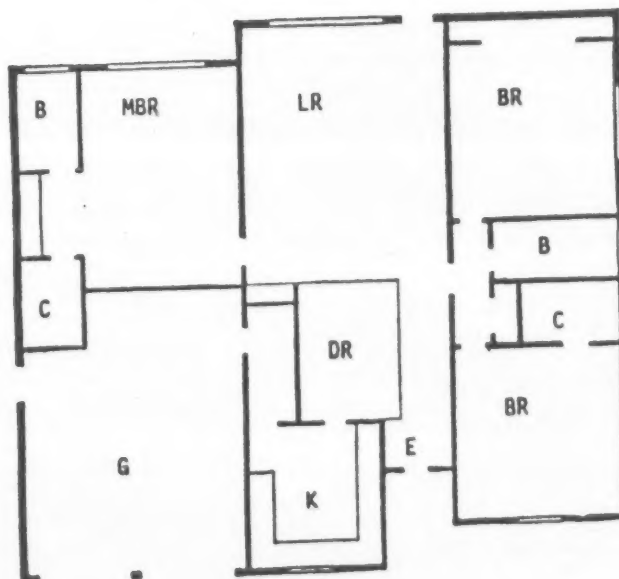
CONCEPT 4

In order to optimize energy utilization, it has been found that building shape plays an important role. For climatic conditions in the Gulf Coast Region an elongation of the east-west axis of 1.6 is optimal.



This plan is designed considering this optimal east-west elongation.

(NORTH)



This plan is basically a square in plan and therefore is not optimally designed from an energy utilization standpoint.

ENERGY CONSERVATION STUDY
(Builder Questionnaire)

Hello. I'm _____ with Higginbotham Associates, a marketing and opinion research firm. We are conducting a study to aid in the development of more energy efficient new homes by using better design and construction techniques.

Section A. Energy Shortage

1a. Which of the statements on this card (Card A) best expresses your own opinion of the energy shortage in the United States today.

I definitely believe there is an energy shortage.....1

There seems to be an energy shortage.....2

I really don't think there is an energy shortage.....3

I definitely believe there is no energy shortage.....4

IF CODE 3 OR 4 CIRCLED IN QUESTION 1a, ASK:

1b. Why do you feel there is no energy shortage?

(RECORD ANSWER AND SKIP TO Q3)

2. Now I am going to read a list of factors some people feel are causing or contributing to the energy shortage. Please select the answer from this card (Card B) that best expresses how important you feel each factor is in contributing to the energy shortage. Just read me the number by the answer that best expresses your opinion.

The first factor is...

	<u>ANSWER</u>	<u>DON'T KNOW NO OPINION</u>
a. The world is running out of fuel supplies	_____	X
b. Efforts of environmentalists to prevent pollution	_____	X
c. Waste of energy in design and operation	_____	X
d. Citizens have been wasteful	_____	X
e. American auto makers	_____	X

3. We are interested in your opinion about the importance of energy usage. For each item I read, please select the answer from Card B, that best expresses how important you feel the item could be as a potential source of energy savings if efforts were made to make this item more energy-consumption efficient.

<u>ITEMS</u>	<u>ANSWERS</u>	<u>DON'T KNOW NO OPINION</u>
a. Automobiles	_____	X
b. Appliances	_____	X
c. Recycling of packaging and containers	_____	X
d. Residential Dwellings	_____	X
e. Commercial Buildings	_____	X
f. Manufacturing Plants	_____	X

Section B. Builders

Now I want to discuss marketing programs currently being used by home builders to sell new homes. First of all...

- 1a. What, in your opinion, are the one or two most effective sales appeals that can be used to persuade prospective new home shoppers to purchase one of the new homes being sold by your firm?

- 1b. What other sales appeals can be used to help persuade new home shoppers to buy from a specific builder?

2. As I read this list of factors and sales appeals that might influence new home shoppers to purchase from a specific home builder, please select the answer from Card B that best expresses your opinion of its importance in persuading them to purchase from a specific builder.

	ANSWER	DON'T KNOW NO OPINION
a. Builder's reputation	_____	X
b. Location of the subdivision	_____	X
c. Quality of construction as can be personally seen and evaluated by buyer	_____	X
d. Total price of house	_____	X
e. Interest rate on loan	_____	X
f. Down payment required	_____	X
g. Amount of monthly payments	_____	X
h. Energy saving design feature	_____	X
i. Efficiency rating of central air conditioning system	_____	X
j. Amount and type of insulation	_____	X
k. Landscaping	_____	X
4a. Do you discuss energy saving features of your new homes either in advertising or personal sales presentations made to prospective home buyers?		

YES.....1

(GO TO 5)---NO.....2

4b. If YES: What?

4c. Do you have any written training instructions or materials for
you sales people to help them explain the advantages of the
energy saving features of your new home?

YES.....1

NO.....2

4d. Do you have any printed brochures telling about the energy saving
features of your new homes to give to prospective new home buyers?

YES.....1

NO.....2

IF YES, ASK IF WE MAY HAVE A COPY AND ATTACH IT TO THIS QUESTIONNAIRE.

- 5a. How effective do you feel this advertising message would be in helping persuade new home shoppers to buy one of your homes:

"We spent an extra \$1,000 in construction cost to make this home 25% more efficient in its use of energy for heating, cooling, and lighting."

How effective would it be? Do you feel it would be...

Extremely effective.....1

Very effective.....2

Not very effective.....3

Not at all effective....4

- 5b. Why do you feel that way?

DON'T KNOW/NO OPINION...X

Section C. Knowledge

1. Now I'm going to read you a list of items that have been suggested by some people as ways to conserve energy in residential dwellings. Please select the answer from Card B that best expresses how important you feel each item would be in conserving energy in a new home.

<u>ITEMS</u>	<u>ANSWER</u>	<u>DON'T KNOW NO OPINION</u>
a. Light colored exterior walls	_____	X
b. Light colored roof	_____	X
c. Insulation of attic and walls	_____	X
d. Size, amount, and location of window space	_____	X
e. Proper lighting design	_____	X
f. Ventilation of attic space	_____	X
g. Location of outside vegetation in the form of trees, shrubs, etc.	_____	X
h. Siting of dwelling on a lot in relation to path of sun	_____	X
i. Shape of building to expose as little wall or roof area as possible to sun	_____	X
j. Natural ventilation of rooms (open windows)	_____	X

ITEMSANSWERDON'T KNOW
NO OPINION

- k. A large amount of window space that can be shaded in summer and exposed in winter

X

2. Now I would like for you to read the statements on this page of the questionnaire and record your answers by circling the code numbers.

HAND QUESTIONNAIRE TO RESPONDENT.

- 2a. Do you agree or disagree with the following statements:

	<u>Agree</u>	<u>Disagree</u>	<u>Don't Know</u>
a. A single story dwelling uses less energy for heating and cooling per square foot of area than a two story house.	1	2	3
b. The natural cover of ground (grass, plants) as opposed to man-made (asphalt, concrete, etc.) tends to stabilize temperatures and decrease extreme variation in temperatures.	1	2	3
c. For proper natural ventilation, the position of the openings on walls are not important.	1	2	3
d. The effectiveness of a shading device changes according to the position of the sun.	1	2	3
e. A 40% reduction in energy use can be achieved by adding suitable ceiling and wall insulation and storm windows.	1	2	3
f. As the thickness of insulation is increased, you get a corresponding and equal reduction in heat loss or gain.	1	2	3
g. Light colors reflect heat; dark colors absorb heat.	1	2	3
h. Outside shading in the form of overhangs, screen walls, and awnings are approximately twice as efficient as interior shading in the form of curtains, blinds, and shades.	1	2	3
i. Building shapes have little or no effect on energy consumption for building heating and cooling.	1	2	3

- 2b. Please record the code letter for the answer you feel comes closest to being correct in the space provided.

RECORD
ANSWERS

- a. Light colored exterior surfaces compared to dark surfaces in the same exposure show temperatures:
A) Lower than B) Same as C) Higher than dark surfaces _____
- b. Horizontal shading devices protect more efficiently around:
A) Southern exposures C) Western exposures
B) Northern exposures D) Eastern exposures _____
- c. Vertical shading devices protect windows or wall openings orientated toward:
A) North/South B) East/West _____
- d. Proper lighting design has the potential of reducing energy consumption for lighting by:
A) 10% B) 30% C) 50% _____
- 2c. What proportion of the total energy consumed in the United States each year do you estimate is used to heat, cool, and light homes? _____ %

Section D. Evaluation of Energy Saving Concepts

Now I would like to get your opinion of several design concepts for conserving energy in single-family dwellings. Please look at the concept and read the description; then I will ask several questions. Here is the first design concept.

ROTATE ORDER OF SHOWING CONCEPTS AS FOLLOWS:

Section E.

1. What is your overall opinion of this concept as something you feel new home buyers would like to have incorporated into the design of the next home they purchase? Do you feel they would:
 - Like it very much.....1
 - Like it slightly.....2
 - Dislike it slightly 3
 - Dislike it very much.....4
 - DON'T KNOW/NO OPINION.....X
2. Why do you say that?
3. How do you feel new home buyers would rate the effectiveness of this concept in conserving energy? Do you feel they would rate it...
 - Extremely effective.....1
 - Very effective.....2
 - Not very effective.....3
 - Not at all effective.....4
 - DON'T KNOW/NO OPINION.....X
4. What influence, if any, do you as a builder feel the concept would have on the total cost of a house built in this city? Please select the answer from Card C that best expresses the influence you feel this concept will have on the total cost of a new house.
- 5a. What influence, if any, do you as a builder feel this concept might have on monthly utility bills in the summer time?
- 5b. What influence, if any, do you as a builder feel this concept might have on monthly utility bills in the winter time?
6. From your point of view as a builder, what are the advantages of this concept? PROBE: What else? Anything else?
7. From your point as a builder, what are the disadvantages of this concept? PROBE: What else? Anything else?

8. What is the probability that you might use this concept in some of the houses you will build in the next few years? Will you:

Definitely use it.....1
 Probably use it.....2
 Probably not use it.....3
 Definitely not use it.....4
 DON'T KNOW/NO OPINION.....X

- 9a. Now I would like for you to look at all the concepts again. Please select the ones you feel your customers in the next few years would definitely like to have in the new homes they purchase, those they might like to have, and those they would definitely not like. RECORD CODES BELOW.

Like to have these concepts... _____
 Might like these concepts..... _____
 Would not like these..... _____

- 9b. Now I would like for you to place the concepts in the order of how much you as a builder feel each concept would add to the cost of constructing a new house--from adding most to adding least. RECORD CODE BELOW.

MOST _____ LEAST

- 9c. This time I would like for you to arrange them in the order of how much energy you feel each concept would save in terms of annual energy consumption. RECORD CODE BELOW.

MOST _____ LEAST

Section E. Where Builders Get Information

- 1a. From which of the following sources do you get your information concerning planning, design, and construction of single-family dwellings? Do you get information from _____ regularly, occasionally, or never?

	<u>Regularly</u>	<u>Occasionally</u>	<u>Never</u>
Trade Shows.....	1	2	3
Trade publications.....	1	2	3
Talking with other builders.....	1	2	3
Salesmen/Manufacturers Reps.....	1	2	3
Talking with Architects.....	1	2	3
Consultants.....	1	2	3
Government Agencies (EPA, HUD, etc.)	1	2	3
Seminars/Workshops.....	1	2	3
Monthly Association Meetings.....	961	2	3

- 1b. What are some of your other sources of information concerning planning, design, and construction of single-family dwellings?

2. Here is a list (Card D) of trade publications. For each publication, tell me if you read it regularly, occasionally, or never.

<u>Building Publications</u>	<u>Regularly</u>	<u>Occasionally</u>	<u>Never</u>
Building Design & Construction.....	1	2	3
NAHB Journal of Homebuilding.....	1	2	3
Professional Builder.....	1	2	3
Builders Journal.....	1	2	3
Building News.....	1	2	3
Journal of Housing.....	1	2	3
Residential Building.....	1	2	3
<u>Architecture Publications</u>			
House & Home.....	1	2	3
Building Design & Construction.....	1	2	3
Progressive Architecture.....	1	2	3
Design & Environment.....	1	2	3
Texas Architect.....	1	2	3
<u>Consumer Publications</u>			
Better Homes & Gardens.....	1	2	3
Southern Living.....	1	2	3
Houston Home & Garden.....	1	2	3

- 3a. Do you recall having ever received, read about, or heard of ways to design and/or construct single-family dwelling units so that they will be more efficient in future consumption of energy used for lighting, heating, and cooling?

YES.....1

(GO TO Q4)--NO.....2

3b. What are some examples of this type of information?

3c. Here is a list (Card E) of some potential sources of this type information. Please tell me from which of the sources you receive this type information on a regular, occasional, or never basis.

	<u>Regular</u>	<u>Occasional</u>	<u>Never</u>
Trade shows/conventions.....	1	2	3
Trade publications.....	1	2	3
Talking with other builders.....	1	2	3
Salesmen/Manufacturers Reps.....	1	2	3
Talking with architects.....	1	2	3
Consultants.....	1	2	3
Government Agencies (EPA, HUD, etc.)	1	2	3
Seminars/Workshops.....	1	2	3
Monthly Association meetings.....	1	2	3

3d. What other sources?

4. How many times have you attended the National Association of Home Builders' Convention in the past five years?

5a. Thinking back over the past five years, how many times have you attended seminars or workshops concerning subjects related to the design, construction, and/or marketing of single-family dwellings?

IF NONE, GO TO Q6

5b. How long did each of the seminars/workshops last?

_____ Half day or less	_____ 3 Days
_____ Full day	_____ 4 Days
_____ 2 Days	_____ 5 or more days

- 5c. How far did you have to travel in order to attend each of these seminars?

_____ In same city	_____ 150-199 Miles
_____ 50-99 Miles	_____ 200-299 Miles
_____ 100-149 Miles	_____ 300 or more Miles

- 5d. And what months did you attend these seminars or workshops?

RECORD NUMBER ATTENDED IN EACH MONTH

Jan _____	Apr _____	Jul _____	Oct _____
Feb _____	May _____	Aug _____	Nov _____
Mar _____	Jun _____	Sep _____	Dec _____

- 5e. Who sponsored the seminars/workshops and what was the general subject?

SPONSOR

SUBJECT

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

- 6a. How interested would you be in attending a one-day workshop held in this city on energy conservation ideas in the design and construction of single-family dwellings and their acceptance by new home buyers and the financial community? Please select the answer from Card F that best expresses your degree of interest in attending the workshop--just read me the number.

- 6b. Why do you say that? PROBE AND CLARIFY.

- 6c. ASK IF NOT IN HOUSTON/HARRIS COUNTY:

Suppose the one-day workshop were to be held in Houston, how interested would you be in attending the workshop?

ANSWER _____

6d. Why do you say that? PROBE AND CLARIFY.

6e. If only one person from your firm was able to attend this workshop, would you be that person or would it be someone else?

Respondent.....1

Someone Else.....2

(Who? Name & Title)

ENERGY CONSERVATION STUDY

(Consumer Questionnaire)

Hello. I'm _____ with Higginbotham Associates, a marketing and opinion research firm. We are conducting a study to aid in the development of more energy efficient new homes by using better design and construction techniques.

Section A. Energy Shortage

- 1a. Which of the statements on this card (Card A) best expresses your own opinion of the energy shortage in the United States today.

I definitely believe there is an energy shortage.....1

There seems to be an energy shortage.....2

I really don't think there is an energy shortage.....3

I definitely believe there is no energy shortage.....4

IF CODE 3 OR 4 CIRCLED IN QUESTION 1a, ASK:

- 1b. Why do you feel there is no energy shortage?

(RECORD ANSWER AND SKIP TO Q3)

2. Now I am going to read a list of factors some people feel are causing or contributing to the energy shortage. Please select the answer from this card (Card B) that best expresses how important you feel each factor is in contributing to the energy shortage. Just read me the number by the answer that best expresses your opinion.

The first factor is. . .

	<u>ANSWER</u>	<u>DON'T KNOW NO OPINION</u>
a. The world is running out of fuel supplies	_____	X
b. Efforts of environmentalists to prevent pollution	_____	X
c. Waste of energy in design and operation of homes	_____	X
d. Citizens have been wasteful	_____	X
e. American auto makers	_____	X

3. We are interested in your opinion about the importance of energy usage. For each item I read, please select the answer from Card B, that best expresses how important you feel the item could be as a potential source of energy savings if efforts were made to make this item more energy-consumption efficient.

<u>ITEMS</u>	<u>ANSWERS</u>	<u>DON'T KNOW NO OPINION</u>
a. Automobiles	_____	X
b. Appliances	_____	X
c. Recycling of packaging and containers	_____	X
d. Residential Dwellings	_____	X
e. Commercial Buildings	_____	X
f. Manufacturing Plants	_____	X

Section B. Purchase of Home (Consumer)

1. Now I would like for you to think about the decision process you went through when you purchased your present home. But first I need to get some information about your home.
- a. How many months have you lived here? _____
- b. What type house? _____
- one-story.....1
- two-story.....2
- 1 1/2 story.....3
- c. How many bedrooms? Number _____
- d. How many bathrooms? Number _____
- e. Total number of rooms in house? Number _____
- f. How much square footage of living area? _____
- g. Type heating/cooking system? All electric.....1
- Gas & electric.....2
- All gas.....3
- h. Was this a custom built home? YES.....1
- NO.....2

2. When you were last shopping for a new home, please tell me how important each factor I will read to you was in your decision to purchase your present home. Select the answer from Card B.

	<u>ANSWER</u>	<u>DON'T KNOW NO OPINION</u>
a. Builder's reputation.....	_____	X
b. Location of the subdivision.....	_____	X
c. Quality of construction as can be personally seen and evaluated by buyer.....	_____	X
d. Total price of house.....	_____	X
e. Interest rate on loan.....	_____	X
f. Down payment required.....	_____	X
g. Amount of monthly payments.....	_____	X
h. Energy saving design feature.....	_____	X
i. Efficiency rating of central air conditioning system.....	_____	X
j. Amount and type of insulation.....	_____	X
k. Landscaping.....	_____	X

3. Please name for me all the specific design and/or construction features of your home that help save energy that is used for lighting, heating, and cooling. PROBE: What others?

Section B. Purchase of Home (Consumer)

4. Now I would like for you to name for me all the design and/or construction features of your home that causes excessive use of energy used for lighting, heating, and cooling.

- 5a. What changes, if any, do you know of that might be made in your home that would help save on your monthly electric bill and/or monthly gas bill? LIST ALL NAMED BELOW.

- 5b. Do you ever plan to re-model your house to make these changes?

RECORD ANSWERS TO Q5a BELOW	Q5b		
	Yes	Not Sure	No
_____	1	2	3
_____	1	2	3
_____	1	2	3
_____	1	2	3

Section C. Knowledge

1. Now I'm going to read you a list of items that have been suggested by some people as ways to conserve energy in residential dwellings. Please select the answer from Card B that best expresses how important you feel each item would be in conserving energy in a new home.

<u>ITEMS</u>	<u>ANSWER</u>	<u>DON'T KNOW NO OPINION</u>
a. Light colored exterior walls	_____	X
b. Light colored roof	_____	X
c. Insulation of attic and walls	_____	X
d. Size, amount, and location of window space	_____	X
e. Proper lighting design	_____	X
f. Ventilation of attic space	_____	X
g. Location of outside vegetation in the form of trees, shrubs, etc.	_____	X
h. Siting of dwelling on a lot in relation to path of sun	_____	X
i. Shape of building to expose as little wall or roof area as possible to sun	_____	X
j. Natural ventilation of rooms(open windows)	_____	X
k. A large amount of window space that can be shaded in summer and exposed in winter	_____	X

2. Now I would like for you to read the statements on this page of the questionnaire and record your answers by circling the code numbers.
HAND QUESTIONNAIRE TO RESPONDENT.

Section C. Knowledge

2a. Do you agree or disagree with the following statements:

	<u>Agree</u>	<u>Dis- agree</u>	<u>Don't Know</u>
a. A single story dwelling uses less energy for heating and cooling per square foot of area than a two story house.	1	2	3
b. The natural cover of ground (grass, plants) as opposed to man-made (asphalt, concrete, etc.) tend to stabilize temperatures and decrease extreme variation in temperatures.	1	2	3
c. For proper natural ventilation, the position of the openings on walls are not important.	1	2	3
d. The effectiveness of a shading device changes according to the position of the sun.	1	2	3
e. A 40% reduction in energy use can be achieved by adding suitable ceiling and wall insulation and storm windows.	1	2	3
f. As the thickness of insulation is increased, you get a corresponding and equal reduction in heat loss or gain.	1	2	3
g. Light colors reflect heat; dark colors absorb heat.	1	2	3
h. Outside shading in the form of overhangs, screen walls, and awnings are approximately twice as efficient as interior shading in the form of curtains, blinds, and shades.	1	2	3
i. Building shapes have little or no effect on energy consumption for building heating and cooling.	1	2	3

2b. Please record the code letter for the answer you feel comes closest to being correct in the space provided.

RECORD
ANSWERS

- a. Light colored exterior surfaces compared to dark surfaces in the same exposure show temperatures:
A) Lower than B) Same as C) Higher than dark surfaces _____

Section C. Knowledge

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RECORD
ANSWERS

2b.

- b. Horizontal shading devices protect more efficiently around:
A) Southern exposures B) Western exposures
C) Northern exposures D) Eastern exposures
- c. Vertical shading devices protect windows or wall openings orientated toward:
A) North/South B) East/West
- d. Proper lighting design has the potential of reducing energy consumption for lighting by:
A) 10% B) 30% C) 50%

- 2c. What proportion of the total energy consumed in the United States each year do you estimate is used to heat, cool, and light homes?

_____ %

Section D. Evaluation of Energy Saving Concepts

Now I would like to get your opinion of several design concepts for conserving energy in single-family dwellings in this part of Texas. Please look at the concept and read the description; then I will ask several questions. Here is the first design concept.

ROTATE ORDER OF SHOWING CONCEPTS AS FOLLOWS:

Section E.

1. What is your overall opinion of this concept as something you would like to have incorporated into the design of the next home you purchase? Do you....

Like it very much.....1

Like it slightly.....2

Dislike it slightly.....3

Dislike it very much.....4

DON'T KNOW/NO OPINION.....X

2. Why do you say that?

3. How effective do you feel this concept would be in conserving energy? Do you feel it would be. . .

Extremely effective.....1

Very effective.....2

Not very effective.....3

Not at all effective.....4

DON'T KNOW/NO OPINION.....X

4. What influence, if any, do you feel the concept would have on the total cost a new house? Please select the answer from Card C that best expresses the influence of this concept on the cost of the house? _____

- 5a. What influence, if any, do you feel this concept might have on monthly utility bills in the summer time? _____

- 5b. What influence, if any, do you feel this concept might have on monthly utility bills in the winter time? _____

6. From your point of view as a homeowner, what are the advantages of this concept? PROBE: What else?
Anything else?

Section E.

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7. From your point of view as a home owner, what are the disadvantages of this concept? PROBE: What else? Anything else?

- 8a. Now I would like for you to look at all the concepts again. Please select the ones you feel you would definitely like to have in your next new home, those you might like to have, and those you would definitely not like. RECORD CODES BELOW.

Like to have these concepts.....

Might like these concepts.....

Would not like these concepts...

- 8b. Now I would like for you to place the concepts in order of how much you feel each concept would add to the cost of constructing a new house--from adding most to adding least. RECORD CODE BELOW.

MOST

LEAST

- 8c. This time I would like for you to arrange them in the order of how much energy you feel each concept would save in terms of annual energy consumption. RECORD CODE BELOW.

MOST

LEAST

Card A

I definitely believe there is an energy shortage

There seems to be an energy shortage

I really don't think there is an energy shortage

I definitely believe there is no energy shortage

Card B

- 6 Important--extremely
- 5 Important--very
- 4 Important--slightly
- 3 Unimportant--slightly
- 2 Unimportant--very
- 1 Unimportant--extremely

Card C

- 9 Increase cost--extremely
- 8 Increase cost--very much
- 7 Increase cost--moderately
- 6 Increase cost--slightly
- 5 Would cause no change
- 4 Decrease cost--slightly
- 3 Decrease cost--moderately
- 2 Decrease cost--very much
- 1 Decrease cost--extremely

Card D

Building Publications

Building Design & Construction
NAHB Journal of Homebuilding
Professional Builder
Builders Journal
Building News
Journal of Housing
Residential Building

Architecture Publications

House & House
Building Design & Construction
Progressive Architecture
Design & Environment
Texas Architect

Consumer Publications

Better Homes & Gardens
Southern Living
Houston Home & Garden

Card E

Trade shows/conventions

Trade publications

Talking with other builders

Salesmen/Manufacturers Reps

Talking with architects

Consultants

Government Agencies (EPA, HUD , etc.)

Seminars/Workshops

Monthly Association meetings

Card F

- 6 Interested--extremely
- 5 Interested--very
- 4 Interested--slightly
- 3 Uninterested--slightly
- 2 Uninterested--very
- 1 Uninterested--extremely

ENERGY CONSERVATION STUDY

Analysis of Financial Sample

May 24, 1976

Analysis of Financial Institution Sample

Section A. Energy Shortage

1. A slight majority (51.9%) of the financial officers definitely believe there is an energy shortage. Another 31% are of the opinion that there seems to be an energy shortage. Only 17% do not believe that an energy shortage exists. This compares favorably with the consumer and builder sub-samples.
2. Among those financial officers who believe an energy shortage exists, approximately 70% rated "waste of energy in the design and operation of homes" as an extremely/very important factor contributing to our energy shortage. This rating exceeds the builder sub-sample by a small margin (3%), but is 8% less than the consumer sub-sample.
3. Approximately 26% of the financial officers rated residential dwellings as an extremely important source of energy savings whereas another 38% rated it as very important. This percentage is quite close to the builder and consumer sub-samples. Only 5% rated this source as unimportant.

••ENERGY CONSERVATION STUDY••

••FINANCIAL INSTITUTION SAMPLE••

TABLE (A) 1 OPINION AS TO THE ENERGY SHORTAGE IN THE UNITED STATES TODAY

	-----TYPE OF-----				-----ASSETS IN-----			-----CITY-----	
	---INSTITUTION---				---MILLIONS---				
	TOTAL	BANKS	S&L'S	GAGE	100	249	250 PLUS	HOUS- TON	OTHER
BASE (NUMBER OF RESPONDENTS)	52	10	18	23	25	11	8	36	16
OPINION ON U.S. ENERGY SHORTAGE...									
DEFINITELY BELIEVE THERE IS ONE	51.9	40.0	55.6	52.2	56.0	63.6	37.5	47.2	62.5
THERE SEEMS TO BE ONE	30.8	40.0	33.3	26.1	24.0	9.1	62.5	36.1	18.7
DON'T REALLY THINK THERE IS ONE	15.4	10.0	11.1	21.7	16.0	27.3	-	16.7	12.9
DEFINITELY BELIEVE THERE IS NONE	1.9	10.0	-	-	4.0	-	-	-	6.3
NO OPINION	-	-	-	-	-	-	-	-	-
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

••ENERGY CONSERVATION STUDY••

••FINANCIAL INSTITUTION SAMPLE••

TABLE (A) 2 IMPORTANCE OF FACTORS IN CAUSING OR CONTRIBUTING TO THE ENERGY SHORTAGE

	-----TYPE OF-----				-----ASSETS IN-----			-----CITY-----	
	-----INSTITUTION-----				-----MILLIONS-----				
	TOTAL	BANKS	S&L'S	MORT- GAGE	UNDER 100	100- 249	250 PLUS	HOUS- TON	OTHER
BASE (FEEL THERE IS AN ENERGY SHORTAGE)	43	8	16	18	20	8	8	30	13
RATED FACTOR EXTREMELY IMPORTANT...									
WORLD RUNNING OUT OF FUEL SUPPLIES	44.2	12.5	50.0	55.6	40.0	62.5	37.5	43.3	46.2
AMERICAN AUTOMAKERS	34.9	37.5	31.3	38.9	35.0	37.5	50.0	33.3	38.5
CITIZENS HAVE BEEN WASTEFUL	30.2	12.5	37.5	33.3	40.0	25.0	12.5	30.0	30.8
WASTE OF ENERGY IN DESIGN AND OPERATION OF HOMES	23.3	12.5	18.8	27.8	30.0	25.0	12.5	23.3	23.1
EFFORTS OF ENVIRONMENTALISTS TO PREVENT POLLUTION	18.6	-	25.0	22.2	15.0	37.5	12.5	23.3	7.7
RATED EXTREMELY/VERY IMPORTANT...									
WORLD RUNNING OUT OF FUEL SUPPLIES	83.7	75.0	87.5	83.3	90.0	100.0	62.5	80.0	92.3
CITIZENS HAVE BEEN WASTEFUL	76.7	62.5	81.3	77.8	75.0	75.0	75.0	80.0	69.2
WASTE OF ENERGY IN DESIGN AND OPERATION OF HOMES	69.8	50.0	87.5	61.1	65.0	75.0	62.5	73.3	61.5
AMERICAN AUTOMAKERS	58.1	75.0	43.8	66.7	60.0	50.0	75.0	56.7	61.5
EFFORTS OF ENVIRONMENTALISTS TO PREVENT POLLUTION	51.2	37.5	43.8	66.7	55.0	62.5	12.5	56.7	38.5
RATED UNIMPORTANT...									
AMERICAN AUTOMAKERS	16.3	12.5	18.8	11.1	15.0	12.5	12.5	13.3	23.1
EFFORTS OF ENVIRONMENTALISTS TO PREVENT POLLUTION	14.0	12.5	6.3	16.7	20.0	-	25.0	10.0	23.1
WASTE OF ENERGY IN DESIGN AND OPERATION OF HOMES	4.7	-	-	11.1	10.0	-	-	6.7	-
WORLD RUNNING OUT OF FUEL SUPPLIES	2.3	-	-	5.6	-	-	-	3.3	-
CITIZENS HAVE BEEN WASTEFUL	-	-	-	-	-	-	-	-	-

TABLE (A) 3 IMPORTANCE OF FACTORS AS A POTENTIAL SOURCE OF ENERGY SAVINGS

	--TYPE OF-- *--ASSETS IN--* *--CITY--*									
	--INSTITUTION-- *--MILLIONS--*									
	MORT- UNDER 100- 250 HOUS-									
	TOTAL	BANKS	S&L'S	GAGE	100	249	PLUS	TON	OTHER	
	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
BASE (FEEL THERE IS AN ENERGY SHORTAGE)	43	8	16	18	20	8	8	30	13	
RATED FACTOR EXTREMELY IMPORTANT...										
AUTOMOBILES	46.5	62.5	43.8	44.4	45.0	37.5	62.5	40.0	61.5	
MANUFACTURING PLANTS	46.5	25.0	56.3	50.0	40.0	50.0	37.5	53.3	30.8	
COMMERCIAL BUILDINGS	37.2	12.5	37.5	50.0	40.0	50.0	25.0	43.3	23.1	
RESIDENTIAL DWELLINGS	25.6	12.5	25.0	33.3	30.0	37.5	25.0	30.0	15.4	
RECYCLING OF PACKAGING & CONTAINERS	23.3	-	31.3	27.8	10.0	50.0	25.0	30.0	7.7	
APPLIANCES	14.0	12.5	12.5	16.7	10.0	12.5	25.0	16.7	7.7	
RATED EXTREMELY/VERY IMPORTANT...										
AUTOMOBILES	86.0	87.5	87.5	83.3	90.0	100.0	75.0	80.0	100.0	
COMMERCIAL BUILDINGS	86.0	75.0	87.5	88.9	90.0	100.0	75.0	83.3	92.3	
MANUFACTURING PLANTS	83.7	62.5	93.8	83.3	80.0	87.5	87.5	86.7	76.9	
RESIDENTIAL DWELLINGS	74.4	50.0	87.5	77.8	65.0	100.0	75.0	73.3	76.9	
RECYCLING OF PACKAGING & CONTAINERS	55.8	37.5	62.5	61.1	55.0	75.0	50.0	56.7	53.8	
APPLIANCES	44.2	25.0	43.8	55.6	40.0	25.0	62.5	50.0	30.8	
RATED UNIMPORTANT...										
APPLIANCES	16.3	25.0	12.5	16.7	15.0	12.5	25.0	13.3	23.1	
RECYCLING OF PACKAGING & CONTAINERS	14.0	25.0	12.5	11.1	15.0	-	12.5	13.3	15.4	
AUTOMOBILES	4.7	12.5	6.3	-	-	-	25.0	6.7	-	
RESIDENTIAL DWELLINGS	4.7	12.5	-	-	10.0	-	-	3.3	7.7	
MANUFACTURING PLANTS	4.7	-	-	11.1	5.0	-	12.5	6.7	-	
COMMERCIAL BUILDINGS	2.3	12.5	-	-	5.0	-	-	-	7.7	

Section B. Finance

1. In terms of designing and constructing homes to conserve energy in day-to-day operations, 87% of our sample considered this to be either extremely or very important. Less than 4% considered it unimportant.
2. The overwhelming majority of financial officers (79%) get their information about energy conservation in residential dwellings from magazines and journals.
3. In terms of factors that are considered important in approving a mortgage loan, 21% of our respondents consider energy savings design features as extremely or very important. This factor ranks well below location (91%) and builder reputation (67%); correspondingly, approximately 42% of the financial officers rated this factor as unimportant. Similarly, amount and type of insulation and average monthly energy cost were rated as unimportant by about 1/3 of our respondents.
4. Despite the findings in number 3, slightly more than 1/3 of our respondents evaluate monthly energy costs in relation to the monthly mortgage payment when making mortgage loans all the time. Thirty per cent do this some of the time, while 35% never do so.
5. Approximately 1/3 of our respondents consider life cycle costs as either extremely or very important in the mortgage loan decision; another 1/3 consider this factor somewhat important. Less than 1/6 of our respondents consider this factor as either very or extremely unimportant.
6. In interim loan financing, approximately 40% of those officers making interim construction loans review designs to determine if homes will be energy efficient.
7. Less than 1/2 of our respondents have written instructions for those who review loan applications. Of the remainder having written instructions, only 1 in 6 have instruction which cover how to evaluate energy savings features of new homes.
8. Approximately 84% of the financial officers expressed some interest in attending a 1 day workshop on energy conservation in the design and construction of residential dwellings.

••ENERGY CONSERVATION STUDY••

••FINANCIAL INSTITUTION SAMPLE••

TABLE (B) 1 HOW IMPORTANT DO YOU FEEL IT IS THAT NEW HOMES BE DESIGNED AND CONSTRUCTED TO CONSERVE ENERGY IN THE DAY-TO-DAY OPERATION OF THE HOME

		---TYPE OF---				*---ASSETS IN---*			*---CITY---*	
		---INSTITUTION---				*---MILLIONS---*				
		TOTAL	BANKS	S&L'S	MORT- GAGE	UNDER 100	100- 249	250 PLUS	HOUS- TON	OTHER
BASE (NUMBER OF RESPONDENTS)		52	10	18	23	25	11	8	36	16
IMPORTANCE OF BUILDING NEW HOMES DESIGNED TO CONSERVE ENERGY... *INDEX*										
IMPORTANT--EXTREMELY	6	55.8	30.0	55.5	69.6	52.0	72.7	50.0	61.1	43.7
IMPORTANT--VERY	5	30.8	40.0	33.3	26.1	28.0	27.3	37.5	27.8	37.5
IMPORTANT--SOMEWHAT	4	9.6	20.0	5.6	4.3	16.0	-	-	8.3	12.5
UNIMPORTANT--SOMEWHAT	3	1.9	10.0	-	-	4.0	-	-	-	6.3
UNIMPORTANT--VERY	2	1.9	-	5.6	-	-	-	12.5	2.8	-
UNIMPORTANT--EXTREMELY	1	-	-	-	-	-	-	-	-	-
NO OPINION		-	-	-	-	-	-	-	-	-
TOTAL		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
•AVERAGE RATING•		5.37	4.90	5.33	5.65	5.28	5.73	5.13	5.44	5.19

****ENERGY CONSERVATION STUDY****

****FINANCIAL INSTITUTION SAMPLE****

TABLE (B) 2 MAJOR SOURCES OF INFORMATION ABOUT THE NEED AND/OR ADVANTAGES OF BUILDING HOMES THAT ARE MORE EFFICIENT IN THEIR DAY-TO-DAY USE OF ENERGY

	---TYPE OF---				*---ASSETS IN---*			*---CITY---*	
	---INSTITUTION---				*---MILLIONS---*				
	TOTAL	BANKS	S&L'S	MORT- GAGE	UNDER 100	100- 249	250 PLUS	HOUS- TON	OTHER
BASE (NUMBER OF RESPONDENTS)	52	10	18	23	25	11	8	36	16
MAJOR SOURCES OF INFORMATION...									
MAGAZINES/JOURNALS	78.8	100.0	83.3	65.2	72.0	81.8	87.5	83.3	68.8
WORKSHOPS/SEMINARS	23.1	40.0	22.2	13.0	28.0	27.3	25.0	25.0	18.8
CONFERENCES/CONVENTIONS	25.0	10.0	27.8	30.4	40.0	9.1	12.5	27.8	18.8
OTHER	26.9	20.0	22.2	34.8	28.0	36.4	12.5	27.8	25.0
NOT REPORTED	1.9	-	5.6	-	-	9.1	-	-	6.3
TOTAL	155.8	170.0	161.1	143.5	168.0	163.6	137.5	163.9	137.5

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****ENERGY CONSERVATION STUDY****

****FINANCIAL INSTITUTION SAMPLE****

TABLE (B) 3A WHETHER RESPONDENT MAKES OR APPROVES MORTGAGE LOANS MADE TO PERSONS PURCHASING NEW HOMES

66-8

	---TYPE OF---			*---ASSETS IN---*			*---CITY---*		
	---INSTITUTION---			*---MILLIONS---*					
	TOTAL	BANKS	S&L'S	MORT- GAGE	UNDER 100	100- 249	250 PLUS	HOUS- TON	OTHER
BASE (NUMBER OF RESPONDENTS)	52	10	18	23	25	11	8	36	16
RESPONDENT MAKES/APPROVES MORTGAGE LOANS									
YES	82.7	50.0	88.9	95.7	88.0	81.8	62.5	83.3	81.2
NO	17.3	50.0	11.1	4.3	12.0	18.2	37.5	16.7	18.8
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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••ENERGY CONSERVATION STUDY••

••FINANCIAL INSTITUTION SAMPLE••

TABLE (B) 3B IMPORTANCE OF FACTORS IN DECISION TO PURCHASE NEW HOME

	-----TYPE OF-----				-----ASSETS IN-----			-----CITY-----	
	---INSTITUTION---				---MILLIONS---				
	TOTAL	BANKS	S&L'S	MORT- GAGE	UNDER 100	100- 249	250 PLUS	HOUS- TON	OTHER
BASE (MAKE OR APPROVE HOME MORTGAGES)	43	5	16	22	22	9	5	30	13
RATED FACTOR EXTREMELY IMPORTANT...									
APPLICANTS' FINANCIAL STATUS	60.5	80.0	50.0	63.6	59.1	55.6	60.0	53.3	76.9
LOCATION OF SUBDIVISION	46.5	40.0	37.5	54.5	40.9	44.4	60.0	40.0	61.5
QUALITY OF CONSTRUCTION	39.5	40.0	50.0	31.8	40.9	44.4	20.0	43.3	30.8
BUILDERS REPUTATION	30.2	60.0	25.0	27.3	40.9	22.2	20.0	26.7	38.5
AMOUNT AND TYPE OF INSULATION	11.6	-	12.5	13.6	9.1	11.1	-	10.0	15.4
ENERGY SAVING DESIGN FEATURES	11.6	-	6.3	18.2	13.6	-	-	13.3	7.7
AVERAGE MONTHLY ENERGY COST	9.3	-	6.3	13.6	9.1	-	-	10.0	7.7
ANNUAL MAINTENANCE COSTS	7.0	-	18.8	-	4.5	11.1	20.0	3.3	15.4
RATED EXTREMELY OR VERY IMPORTANT...									
LOCATION OF SUBDIVISION	90.7	60.0	100.0	90.9	86.4	100.0	100.0	93.3	84.6
BUILDERS REPUTATION	67.4	100.0	75.0	54.5	63.6	88.9	60.0	63.3	76.9
AMOUNT AND TYPE OF INSULATION	30.2	40.0	25.0	31.8	36.4	22.2	-	26.7	38.5
ANNUAL MAINTENANCE COSTS	23.3	20.0	31.3	18.2	31.8	11.1	20.0	23.3	23.1
AVERAGE MONTHLY ENERGY COST	23.3	40.0	6.3	31.8	31.8	-	-	13.3	46.2
ENERGY SAVING DESIGN FEATURES	20.9	20.0	12.5	27.3	31.8	-	-	20.0	23.1
QUALITY OF CONSTRUCTION	-	-	-	-	-	-	-	-	-
APPLICANTS' FINANCIAL STATUS	-	-	-	-	-	-	-	-	-
RATED FACTOR UNIMPORTANT...									
ENERGY SAVING DESIGN FEATURES	41.9	40.0	43.8	40.9	40.9	33.3	100.0	50.0	23.1
AMOUNT AND TYPE OF INSULATION	37.2	40.0	31.3	40.9	36.4	22.2	100.0	43.3	23.1
AVERAGE MONTHLY ENERGY COST	34.9	40.0	43.8	27.3	22.7	55.6	80.0	36.7	30.8
ANNUAL MAINTENANCE COSTS	14.0	20.0	12.5	13.6	9.1	11.1	60.0	16.7	7.7
LOCATION OF SUBDIVISION	2.3	20.0	-	-	4.5	-	-	3.3	-
BUILDERS REPUTATION	2.3	-	-	4.5	-	-	-	-	7.7
QUALITY OF CONSTRUCTION	-	-	-	-	-	-	-	-	-
APPLICANTS' FINANCIAL STATUS	-	-	-	-	-	-	-	-	-

••ENERGY CONSERVATION STUDY••

••FINANCIAL INSTITUTION SAMPLE••

TABLE (B) 3C WHEN MAKING MORTGAGE LOANS, DO YOU EXAMINE AND EVALUATE THE MONTHLY COSTS OF ENERGY REQUIRED TO OPERATE THE HOME IN RELATION TO THE AMOUNT OF THE MONTHLY MORTGAGE PAYMENT

	•---TYPE OF---•				•---ASSETS IN---•			•---CITY---•	
	•---INSTITUTION---•				•---MILLIONS---•				
	TOTAL	BANKS	S&L'S	MORT- GAGE	UNDER 100	100- 249	250 PLUS	HOUS- TON	OTHER
BASE (MAKE OR APPROVE HOME MORTGAGES)	43	5	16	22	22	9	5	30	13
EVALUATE MONTHLY ENERGY COSTS IN RELATION TO MONTHLY MORTGAGE PAYMENT...									
ALL OF THE TIME	34.9	20.0	18.7	50.0	31.8	33.3	40.0	33.3	38.4
SOME OF THE TIME	30.2	20.0	43.8	22.7	36.4	33.3	20.0	30.0	30.8
NEVER	34.9	60.0	37.5	27.3	31.8	33.4	40.0	36.7	30.8
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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••ENERGY CONSERVATION STUDY••

••FINANCIAL INSTITUTION SAMPLE••

TABLE (B) 3D HOW IMPORTANT ARE LIFE-CYCLE COST CONSIDERATIONS IN THE MORTGAGE LOAN DECISION

		---TYPE OF---				*---ASSETS IN---*			*---CITY---*	
		---INSTITUTION---				*---MILLIONS---*				
		TOTAL	BANKS	S&L'S	MORT- GAGE	UNDER 100	100- 249	250 PLUS	HOUS- TON	OTHER
BASE (MAKE OR APPROVE HOME MORTGAGES)		43	5	16	22	22	9	5	30	13
DEGREE OF IMPORTANCE...										
IMPORTANT--EXTREMELY	6	2.3	-	-	4.5	-	-	-	3.3	-
IMPORTANT--VERY	5	30.2	20.0	37.5	27.3	45.5	33.4	-	23.3	46.1
IMPORTANT--SOMEWHAT	4	32.6	40.0	25.0	36.4	31.8	22.2	20.0	33.3	30.8
UNIMPORTANT--SOMEWHAT	3	18.6	40.0	6.2	22.7	18.2	22.2	20.0	16.7	23.1
UNIMPORTANT--VERY	2	11.6	-	25.0	4.5	4.5	11.1	40.0	16.7	-
UNIMPORTANT--EXTREMELY	1	4.7	-	6.3	4.6	-	11.1	20.0	6.7	-
NO OPINION		-	-	-	-	-	-	-	-	-
TOTAL		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AVERAGE RATING		3.79	3.80	3.63	3.91	4.18	3.56	2.40	3.60	4.23

ENERGY CONSERVATION STUDY

FINANCIAL INSTITUTION SAMPLE

TABLE (B) 4A/B/C QUESTIONS CONCERNING INTERIM FINANCING CONSTRUCTION LOANS TO HOME BUILDERS

	---TYPE OF---				*---ASSETS IN---*			*---CITY---*	
	---INSTITUTION---				*---MILLIONS---*				
	TOTAL	BANKS	S&L'S	MORT- GAGE	UNDER 100	100- 249	250 PLUS	HOUS- TON	OTHER
BASE (NUMBER OF RESPONDENTS)	52	10	18	23	25	11	8	36	16
RESPONDENT MAKES/APPROVES INTERIM FINANCING CONSTRUCTION LOANS...									
YES	65.4	80.0	61.1	60.9	76.0	63.6	75.0	58.3	81.2
NO	34.6	20.0	38.9	39.1	24.0	36.4	25.0	41.7	18.8
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BASE (MAKE/APPROVE INTERIM LOANS)	34	8	11	14	19	7	6	21	13
REVIEW THE DESIGN & SPECIFICATIONS TO SEE IF BUILDER MAKING HOMES THAT SELL...									
YES	97.1	100.0	100.0	92.9	94.7	100.0	100.0	95.2	100.0
NO	2.9	-	-	7.1	5.3	-	-	4.8	-
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BASE (REVIEW DESIGN & SPECIFICATIONS)	33	8	11	13	18	7	6	20	13
REVIEW DESIGN & SPECIFICATIONS TO SEE IF HOME WILL BE EFFICIENT IN USE OF ENERGY									
YES	39.4	37.5	45.5	38.5	44.4	57.1	16.7	45.0	30.8
NO	60.6	62.5	54.5	61.5	55.6	42.9	83.3	55.0	69.2
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

****ENERGY CONSERVATION STUDY****

****FINANCIAL INSTITUTION SAMPLE****

TABLE (B) 5A/B QUESTIONS CONCERNING WRITTEN INSTRUCTIONS OR MATERIALS FOR PERSONS WHO REVIEW LOAN APPLICATIONS

	---TYPE OF---			*---ASSETS IN---*			*---CITY---*		
	---INSTITUTION---			*---MILLIONS---*					
	TOTAL	BANKS	S&L'S	MORT- GAGE	UNDER 100	250 249	HOUS- PLUS TON	OTHER	
BASE (NUMBER OF RESPONDENTS)	52	10	18	23	25	11	8	36	16
HAVE WRITTEN INSTRUCTIONS OR MATERIAL FOR PEOPLE WHO REVIEW LOAN APPLICATIONS									
YES	46.2	30.0	44.4	52.2	60.0	54.5	25.0	41.7	56.2
NO	53.8	70.0	55.6	47.8	40.0	45.5	75.0	58.3	43.8
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
BASE (HAVE INSTRUCTIONS/MATERIAL)	24	3	8	12	15	6	2	15	9
COVERS EVALUATION OF ENERGY SAVING FEATURES AND INFLUENCE ON BUDGET...									
YES	16.7	33.3	12.5	16.7	20.0	16.7	-	13.3	22.2
NO	83.3	66.7	87.5	83.3	80.0	83.3	100.0	86.7	77.8
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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FINANCIAL INSTITUTION SAMPLE

TABLE (B) 6 HOW GO ABOUT EVALUATING NEW TRENDS IN DESIGN AND/OR CONSTRUCTION OSINGLE FAMILY HOUSING BEFORE MAKING INTERIM FINANCING LOANS

	*---TYPE OF---				*---ASSETS IN---			*---CITY---	
	*---INSTITUTION---				*---MILLIONS---				
	TOTAL	BANKS	S&L'S	GAGE	MORT- 100	UNDER 100- 249	250 PLUS	HOUS- TON	OTHER
BASE (NUMBER OF RESPONDENTS)	52	10	18	23	25	11	8	36	16
EVALUATE BY...									
USE OF OWN KNOWLEGE	42.3	60.0	50.0	30.4	44.0	36.4	62.5	38.9	50.0
RELY ON BUILDERS JUDGEMENT	38.5	80.0	33.3	21.7	52.0	27.3	37.5	36.1	43.8
ASK FOR INDEPENDENT FEASIBILITY STUDY	30.8	10.0	33.3	39.1	28.0	36.4	37.5	36.1	18.8
OTHER WAY	7.7	-	11.1	8.7	8.0	9.1	12.5	8.3	6.3
NOT REPORTED	17.3	10.0	11.1	26.1	12.0	9.1	12.5	19.4	12.5
TOTAL	136.5	160.0	138.9	126.1	144.0	118.2	162.5	138.9	131.3

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••ENERGY CONSERVATION STUDY••

••FINANCIAL INSTITUTION SAMPLE••

TABLE (B) 7 DEGREE OF INTEREST IN ATTENDING A ONE-DAY WORKSHOP HELD IN THIS CITY ON ENERGY CONSERVATION IDEAS IN THE DESIGN AND CONSTRUCTION OF SINGLE-FAMILY DWELLINGS, THEIR INFLUENCE ON MONTHLY OPERATING COSTS, AND THEIR ACCEPTANCE BY CONSUMERS

	---TYPE OF---				*---ASSETS IN---*			*---CITY---*	
	---INSTITUTION---				*---MILLIONS---*				
	TOTAL	BANKS	S&L'S	MORT- GAGE	UNDER 100	100- 249	250 PLUS	HOUS- TON	OTHER
BASE (TOTAL RESPONDENTS)	52	10	18	23	25	11	8	36	16
DEGREE OF INTEREST IN ATTENDING...									
INTERESTED--EXTREMELY	23.1	20.0	11.1	34.8	32.0	27.3	-	25.0	18.7
INTERESTED--VERY	28.8	30.0	33.3	21.7	36.0	18.2	25.0	30.5	25.0
INTERESTED--SLIGHTLY	32.7	50.0	38.9	21.7	32.0	36.3	25.0	27.8	43.7
UNINTERESTED--SLIGHTLY	9.6	-	11.1	13.0	-	9.1	25.0	11.1	6.3
UNINTERESTED--VERY	3.9	-	5.6	4.4	-	9.1	12.5	5.6	-
UNINTERESTED--EXTREMELY	1.9	-	-	4.4	-	-	12.5	-	6.3
NO OPINION GIVEN	-	-	-	-	-	-	-	-	-
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Section C. Energy Related Knowledge

1. In terms of ways to conserve energy in residential dwellings, substantial agreement exists among our respondents with respect to the importance of insulation, ventilation and size, amount and location of window space. The financial institution sub-sample percentages correspond closely to the percentages in our other sub-samples. A slight majority of our sub-sample perceive the following as either extremely or very important: outside vegetation-59.6%, natural ventilation-59.6%, lighting design-57.7%, shaded window space-57.7%, siting-55.8%, and light colored roof-53.8%.
2. On the thirteen item knowledge test, financial officers perform reasonably well. In fact, on Questions 1, 2, 3, 5, 6, 7, 8, 9, and 10, they generally perform as well as either builders or consumers. On Question 4, they perform substantially better. And on Question 11, 12 and 13, they do poorly, more so than our other sub-samples.
3. When asked what proportion of the total energy is used to heat, cool and light homes, they, too, substantially overestimated the actual percentage, although the dispersion was not as great as in our previous sub-samples.

****ENERGY CONSERVATION STUDY****

****FINANCIAL INSTITUTION SAMPLE****

TABLE (C) 1 IMPORTANCE OF FACTORS IN WAYS TO CONSERVE ENERGY

	-----TYPE OF-----				*---ASSETS IN---*			*---CITY---	
	*---INSTITUTION---				*---MILLIONS---				
	TOTAL	BANKS	S&L'S	MORT- GAGE	UNDER 100	100- 249	250 PLUS	HOUS- TON	OTHER
BASE (NUMBER OF RESPONDENTS)	52	10	18	23	25	11	8	36	16
RATED FACTOR EXTREMELY IMPORTANT...									
INSULATION OF ATTIC AND WALLS	69.2	70.0	61.1	78.3	80.0	54.5	62.5	63.9	81.3
VENTILATION OF ATTIC SPACE	55.8	60.0	38.9	69.6	60.0	63.6	50.0	58.3	50.0
SIZE, AMOUNT, LOCATION OF WINDOW SPACE	42.3	20.0	38.9	56.5	48.0	27.3	25.0	52.8	18.8
NATURAL VENTILATION OF ROOMS	26.9	40.0	16.7	30.4	32.0	18.2	12.5	25.0	31.3
BUILDING SHAPED FOR LEAST SUN EXPOSURE	25.0	20.0	11.1	39.1	24.0	18.2	25.0	33.3	6.3
SITING OF DWELLING RELATED TO SUN PATH	23.1	20.0	11.1	34.8	24.0	18.2	25.0	30.6	6.3
WINDOW SPACE THAT CAN BE SHADED/EXPOSED	19.2	20.0	11.1	26.1	24.0	9.1	-	16.7	25.0
LOCATION OF OUTSIDE VEGETATION	15.4	10.0	11.1	21.7	16.0	18.2	12.5	19.4	6.3
LIGHT COLORED ROOF	11.5	10.0	5.6	17.4	12.0	-	25.0	13.9	6.3
LIGHT COLORED EXTERIOR WALLS	9.6	-	5.6	17.4	12.0	-	12.5	11.1	6.3
PROPER LIGHTING DESIGN	9.6	10.0	-	17.4	12.0	9.1	-	11.1	6.3
RATED FACTOR EXTREMELY/VERY IMPORTANT...									
INSULATION OF ATTIC AND WALLS	98.1	100.0	94.4	100.0	100.0	90.9	100.0	97.2	100.0
SIZE, AMOUNT, LOCATION OF WINDOW SPACE	90.4	90.0	88.9	91.3	92.0	90.9	75.0	91.7	87.5
VENTILATION OF ATTIC SPACE	90.4	90.0	83.3	95.7	96.0	81.8	87.5	91.7	87.5
LOCATION OF OUTSIDE VEGETATION	59.6	60.0	50.0	69.6	64.0	54.5	37.5	61.1	56.3
NATURAL VENTILATION OF ROOMS	59.6	60.0	55.6	65.2	68.0	54.5	25.0	58.3	62.5
PROPER LIGHTING DESIGN	57.7	40.0	66.7	60.9	52.0	72.7	75.0	63.9	43.8
WINDOW SPACE THAT CAN BE SHADED/EXPOSED	57.7	50.0	55.6	65.2	72.0	45.5	25.0	61.1	50.0
SITING OF DWELLING RELATED TO SUN PATH	55.8	50.0	44.4	69.6	56.0	54.5	50.0	63.9	37.5
LIGHT COLORED ROOF	53.8	50.0	55.6	56.5	52.0	63.6	50.0	50.0	62.5
BUILDING SHAPED FOR LEAST SUN EXPOSURE	48.1	30.0	38.9	65.2	52.0	54.5	37.5	58.3	25.0
LIGHT COLORED EXTERIOR WALLS	40.4	20.0	44.4	47.8	40.0	45.5	37.5	38.9	43.8
RATED FACTOR UNIMPORTANT...									
LIGHT COLORED EXTERIOR WALLS	17.3	20.0	16.7	13.0	12.0	9.1	37.5	16.7	18.8
PROPER LIGHTING DESIGN	15.4	20.0	11.1	13.0	16.0	-	25.0	13.9	18.8
LIGHT COLORED ROOF	9.6	-	11.1	8.7	8.0	9.1	25.0	13.9	-
NATURAL VENTILATION OF ROOMS	9.6	10.0	5.6	8.7	4.0	18.2	12.5	5.6	18.8
SITING OF DWELLING RELATED TO SUN PATH	7.7	-	16.7	4.3	8.0	-	12.5	8.3	6.3
BUILDING SHAPED FOR LEAST SUN EXPOSURE	5.8	-	11.1	4.3	-	9.1	-	5.6	6.3
WINDOW SPACE THAT CAN BE SHADED/EXPOSED	3.8	-	11.1	-	-	18.2	-	2.8	6.3
INSULATION OF ATTIC AND WALLS	1.9	-	5.6	-	-	9.1	-	2.8	-
VENTILATION OF ATTIC SPACE	1.9	-	-	4.3	-	-	-	2.8	-
SIZE, AMOUNT, LOCATION OF WINDOW SPACE	-	-	-	-	-	-	-	-	-
LOCATION OF OUTSIDE VEGETATION	-	-	-	-	-	-	-	-	-

••ENERGY CONSERVATION STUDY••

••FINANCIAL INSTITUTION SAMPLE••

TABLE (C) 2A KNOWLEDGE ON VARIOUS ENERGY CONCEPTS

	-----TYPE OF-----				-----ASSETS IN-----			-----CITY-----	
	---INSTITUTION---				---MILLIONS---				
	TOTAL	BANKS	S&L'S	GAGE	MORT- 100	UNDER 100- 249	250 PLUS	HOUS- TON	OTHER
BASE (NUMBER OF RESPONDENTS)	52	10	18	23	25	11	8	36	16
A SINGLE STORY DWELLING USED LESS ENERGY FOR HEATING AND COOLING PER SQUARE FOOT OF AREA THAN A TWO STORY HOUSE.									
AGREE	46.2	30.0	38.9	60.9	44.0	36.4	50.0	55.6	25.0
DISAGREE	42.3	70.0	44.4	26.1	48.0	54.5	37.5	30.6	68.8
NO OPINION	11.5	-	16.7	13.0	8.0	9.1	12.5	13.9	6.3
THE NATURAL COVER OF GROUND TENDS TO STABILIZE TEMPERATURES AND DECREASE EXTREME VARIATION IN TEMPERATURES									
AGREE	88.5	100.0	83.3	87.0	92.0	81.8	100.0	86.1	93.8
DISAGREE	7.7	-	5.6	13.0	8.0	9.1	-	8.3	6.3
NO OPINION	3.8	-	11.1	-	-	9.1	-	5.6	-
FOR PROPER NATURAL VENTILATION, THE POSITION OF THE OPENINGS ON WALLS ARE NOT IMPORTANT									
AGREE	5.8	-	11.1	4.3	8.0	9.1	-	8.3	-
DISAGREE	86.5	100.0	72.2	91.3	84.0	81.8	87.5	83.3	93.8
NO OPINION	7.7	-	16.7	4.3	8.0	9.1	12.5	6.3	6.3
THE EFFECTIVENESS OF A SHADING DEVICE CHANGES ACCORDING TO THE SUN'S POSITION									
AGREE	96.2	100.0	94.4	100.0	96.0	100.0	87.5	94.4	100.0
DISAGREE	-	-	-	-	-	-	-	-	-
NO OPINION	3.8	-	5.6	-	4.0	-	12.5	5.6	-
A 40 PER CENT REDUCTION IN ENERGY USE CAN BE ACHIEVED BY ADDING SUITABLE CEILING & WALL INSULATION & STORM WINDOW									
AGREE	71.2	60.0	83.3	69.6	72.0	72.7	62.5	77.8	56.3
DISAGREE	7.7	-	11.1	8.7	4.0	9.1	25.0	8.3	6.3
NO OPINION	21.2	40.0	5.6	21.7	24.0	18.2	12.5	13.9	37.5

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ENERGY CONSERVATION STUDY

FINANCIAL INSTITUTION SAMPLE

TABLE (C) 2A KNOWLEDGE ON VARIOUS ENERGY CONCEPTS

	---TYPE OF---		*---ASSETS IN---*				*---CITY---*		
	---INSTITUTION---		*---MILLIONS---*						
	TOTAL	BANKS	S&L'S	MORT- GAGE	UNDER 100	100- 249	250 PLUS	HOUS- TON	OTHER
AS THE THICKNESS OF INSULATION IS INCREASED, YOU GET A CORRESPONDING AND EQUAL REDUCTION IN HEAT LOSS OR GAIN									
AGREE	59.6	60.0	55.6	65.2	56.0	63.6	62.5	69.4	37.5
DISAGREE	30.8	40.0	27.8	26.1	36.0	18.2	37.5	19.4	56.3
NO OPINION	9.6	-	16.7	8.7	8.0	18.2	-	11.1	6.3
LIGHT COLORS REFLECT HEAT, DARK COLORS ABSORB HEAT									
AGREE	94.2	100.0	94.4	91.3	96.0	90.9	100.0	94.4	93.8
DISAGREE	3.8	-	-	8.7	4.0	-	-	2.8	6.3
NO OPINION	1.9	-	5.6	-	-	9.1	-	2.8	-
OUTSIDE SHADING IN THE FORM OF OVERHANGS , SCREEN WALLS, AND AWNINGS ARE APPROX. TWICE AS EFFECTIVE AS INTERIOR SHADING IN THE FORM OF CURTAINS, BLINDS, & SHADES									
AGREE	59.6	70.0	66.7	52.2	64.0	54.5	75.0	66.7	43.8
DISAGREE	15.4	10.0	11.1	17.4	16.0	9.1	12.5	13.9	18.8
NO OPINION	25.0	20.0	22.2	30.4	20.0	36.4	12.5	19.4	37.5
BUILDING SHAPES HAVE LITTLE OR NO EFFECT ON ENERGY CONSUMPTION FOR BUILDING HEATING AND COOLING									
AGREE	11.5	-	11.1	13.0	12.0	9.1	25.0	13.9	6.3
DISAGREE	75.9	90.0	72.2	78.3	72.0	81.8	75.0	75.0	81.3
NO OPINION	11.5	10.0	16.7	8.7	16.0	9.1	-	11.1	12.5

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TABLE (C) 28 KNOWLEDGE ON VARIOUS ENERGY SAVING CONCEPTS

	-----TYPE OF-----				-----ASSETS IN-----			-----CITY-----	
	---INSTITUTION---				---MILLIONS---				
	TOTAL	BANKS	S&L'S	MORT- GAGE	UNDER 100	100- 249	250 PLUS	HOUS- TON	OTHER
BASE (TOTAL RESPONDENTS)	52	10	18	23	25	11	8	36	16
LIGHT COLORED EXTERIOR SURFACES COMPARED TO DARK SURFACES IN THE SAME EXPOSURE SHOW TEMPERATURES...									
LOWER THAN DARK SURFACES	96.2	100.0	94.4	95.7	96.0	90.9	100.0	97.2	93.7
SAME AS DARK SURFACES	-	-	-	-	-	-	-	-	-
HIGHER THAN DARK SURFACES	3.8	-	5.6	4.3	4.0	9.1	-	2.8	6.3
DON'T KNOW/NO OPINION	-	-	-	-	-	-	-	-	-
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
HORIZONTAL SHADING DEVICES PROTECT MORE EFFICIENTLY AROUND...									
SOUTHERN EXPOSURES	23.1	50.0	11.1	17.4	32.0	9.1	25.0	13.9	43.7
NORTHERN EXPOSURES	63.4	40.0	72.2	69.6	56.0	63.6	62.5	72.2	43.7
WESTERN EXPOSURES	-	-	-	-	-	-	-	-	-
EASTERN EXPOSURES	7.7	-	5.6	13.0	12.0	9.1	-	8.3	5.3
DON'T KNOW/NO OPINION	5.8	10.0	11.1	-	-	18.2	12.5	5.6	6.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
VERTICAL SHADING DEVICES PROTECTS WINDOWS OR WALL OPENINGS ORIENTED...									
TOWARD NORTH/SOUTH	34.6	50.0	27.8	34.8	40.0	27.3	50.0	33.3	37.5
TOWARD EAST/WEST	59.6	40.0	61.1	65.2	60.0	54.5	37.5	61.1	56.2
DON'T KNOW/NO OPINION	5.8	10.0	11.1	-	-	18.2	12.5	5.6	6.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
PROPER LIGHTING DESIGN HAS THE POTENTIAL OF REDUCING ENERGY CONSUMPTION FOR LIGHTING BY...									
10 PER CENT	46.2	60.0	55.5	34.8	52.0	45.4	50.0	38.9	62.5
30 PER CENT	36.5	20.0	33.3	43.5	32.0	36.4	37.5	41.7	25.0
50 PER CENT	9.6	10.0	5.6	13.0	12.0	9.1	-	11.1	6.2
DON'T KNOW/NO OPINION	7.7	10.0	5.6	8.7	4.0	9.1	12.5	8.3	6.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

****ENERGY CONSERVATION STUDY****

****FINANCIAL INSTITUTION SAMPLE****

TABLE (C) 2C WHAT PROPORTION OF THE TOTAL ENERGY CONSUMED IN THE UNITED STATES EACH YEAR DO YOU ESTIMATE IS USED TO HEAT, COOL, AND LIGHT HOMES

	---TYPE OF---				*---ASSETS IN---*			*---CITY---*	
	---INSTITUTION---	*---MILLIONS---*							
	TOTAL	BANKS	S&L'S	MORT- GAGE	UNDER 100	100- 249	250 PLUS	HOUS- TON	OTHER
BASE (NUMBER OF RESPONDENTS)	52	10	18	23	25	11	8	36	16
PER CENT OF TOTAL ENERGY CONSUMED...									
1 - 9	3.9	-	5.5	4.3	4.0	-	12.5	2.8	6.2
10 - 19	11.5	-	-	21.7	12.0	-	12.5	11.1	12.5
20 - 29	23.1	40.0	16.7	21.7	28.0	18.2	25.0	16.7	37.5
30 - 39	19.2	30.0	22.2	13.0	12.0	18.2	37.5	25.0	6.2
40 - 49	11.5	20.0	11.1	8.7	16.0	9.1	12.5	11.1	12.5
50 - 59	7.7	-	5.5	13.1	8.0	9.1	-	11.1	-
60 - 69	7.7	-	5.6	13.1	8.0	9.1	-	11.1	-
70 - 79	1.9	-	5.6	-	4.0	-	-	-	6.3
80 - 89	3.9	10.0	5.6	-	4.0	9.1	-	2.8	6.3
90 - 100	-	-	-	-	-	-	-	-	-
DK/NR	9.6	-	22.2	4.4	4.0	27.2	-	8.3	12.5
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AVERAGE PER CENT	34.11	34.00	38.93	31.95	34.83	41.88	25.25	35.67	30.43

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Section D. Evaluation of Energy Concepts

1. In terms of whether financial officers perceive these concepts as something perspective home buyers might like, the majority of our respondents answer in the affirmative-75% see homebuyers liking to some degree the shading concept; 86%-the cross ventilation concept; 77%-natural wind cooling, and 73%-housing shape. All of these percentages are substantially higher than the builder sub-sample, and equivalent to the consumer sub-sample.
2. The vast majority of financial officers (over 70%) perceive home buyers as rating the shading and cross ventilation concepts as either extremely or very effective in conserving energy. Approximately half of our respondents see natural wind cooling as effective and less than half (43%) see housing shape as effective. On the whole, financial officers tend to be more optimistic than builders and slightly less optimistic than consumers.
3. With respect to how much each concept would add to the cost of a new house, a substantial majority (77%) see shading as increasing the cost; a slight majority (51%) see natural wind cooling as increasing the cost. Interestingly, a substantial minority (40%) see housing shape as decreasing the cost-- which is possibly a response to our box shape drawings. The ratings of financial officers appear to be consistent with those of our other sub-samples.
4. In terms of these concepts influence on utility bills, these respondents perceive that all of the concepts will decrease utility bills, more so in the summer than the winter. These respondents do, however, believe that shading and natural wind cooling are likely to be more effective than the other concepts. Once again, the results appear similar to those in the other sub-samples.
5. With regard to interim financing for builders, these concepts exert no influence on that decision for most financial officers. The shading concept, however, evokes a positive response from 27% of the financial officers.
6. Financial officers perceive consumers as responding favorably to most of the concepts tested. In the "liking" category, shading is the most frequently mentioned (44%) followed closely by natural wind cooling (36.5%) and cross ventilation (35%). In

the "might like" category, cross ventilation leads the way (58%) followed by housing shape (40%). In the "would not like" category, house shape, natural wind cooling and shading are opposed by 25% of our respondents. Generally, financial officer responses tend to be more favorable than the builder sub-sample and similar to the consumer sub-sample.

7. With respect to the additional cost associated with each concept, a substantial minority of financial officers see shading (40%) and wind cooling (36%) as adding the most to the cost of a home and housing shape adding the least cost (52%). These rankings correspond to those expressed by our other sub-samples.
8. In terms of annual energy consumption savings, financial officers (44%), like builders and consumers, believe shading would save the most energy. Similarly, they perceive housing shape as saving the least energy which corresponds to the results in our other sub-samples.

TABLE (E) S1 SUMMARY OF CONCEPT OPINIONS

		-----CONCEPT-----			
		1	2	3	4
		-----	-----	-----	-----
BASE (TOTAL RESPONDENTS)		52	52	52	52
OVERALL OPINION OF CONCEPT...		*INDEX*			
LIKE IT VERY MUCH	5	34.6	19.2	32.7	17.3
LIKE IT SLIGHTLY	4	48.1	67.3	44.2	55.8
NO OPINION	3	3.8	1.9	-	3.8
DISLIKE IT SLIGHTLY	2	9.6	9.6	7.7	13.5
DISLIKE IT VERY MUCH	1	3.8	1.9	15.4	9.6
TOTAL		100.0	100.0	100.0	100.0
AVERAGE RATING		4.00	3.92	3.71	3.58
EFFECTIVENESS IN CONSERVING ENERGY...					
EXTREMELY	5	9.6	7.7	1.9	7.7
VERY	4	67.3	65.4	48.1	36.5
NO OPINION	3	3.8	1.9	9.6	11.5
NOT VERY	2	17.3	25.0	34.6	36.5
NOT AT ALL	1	1.9	-	5.8	7.7
TOTAL		100.0	100.0	100.0	100.0
AVERAGE RATING		3.55	3.56	3.06	3.00
INFLUENCE ON TOTAL COST OF HOUSE...					
INCREASE COST	9-6	76.9	42.3	51.9	26.9
CAUSE NO CHANGE	5	17.3	44.2	36.5	32.7
DECREASE COST	4-1	5.8	13.5	11.5	40.4
AVERAGE RATING		6.02	5.48	5.74	4.71
INFLUENCE ON UTILITY BILLS IN SUMMER...					
INCREASE COST	9-6	5.8	7.7	3.8	9.6
CAUSE NO CHANGE	5	5.8	17.3	19.2	21.2
DECREASE COST	4-1	88.5	75.0	76.9	69.2
AVERAGE RATING		3.64	3.96	3.86	4.02
INFLUENCE ON UTILITY BILLS IN WINTER...					
INCREASE COST	9-6	11.5	15.4	9.6	13.5
CAUSE NO CHANGE	5	25.0	38.5	32.7	32.7
DECREASE COST	4-1	63.5	46.2	57.7	53.8
AVERAGE RATING		4.16	4.50	4.26	4.32
CONCEPT DEFINITIONS					
CONCEPT 1 SHADING					
CONCEPT 2 CROSS-VENTILATION					
CONCEPT 3 NATURAL WIND COOLING					
CONCEPT 4 SHAPE OF HOUSE					

****ENERGY CONSERVATION STUDY****

****FINANCIAL INSTITUTION SAMPLE****

TABLE (E) S2 WHETHER THE DESIGN CONCEPT WOULD INFLUENCE PROVIDING THE BUILDER INTERIM FINANCING

	-----CONCEPT-----			
	1	2	3	4
BASE (NUMBER OF RESPONDENTS)	52	52	52	52
IN REGARDS TO PROVIDING BUILDER WITH INTERIM FINANCING, THIS CONCEPT WOULD BE				
A FAVORABLE INFLUENCE	26.9	15.4	13.5	11.5
A NEGATIVE INFLUENCE	-	1.9	9.6	5.8
NO INFLUENCE	73.1	82.7	76.9	82.7
TOTAL	100.0	100.0	100.0	100.0

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****CONCEPT DEFINITIONS****

CONCEPT 1 SHADING
 CONCEPT 2 CROSS-VENTILATION
 CONCEPT 3 NATURAL WIND COOLING
 CONCEPT 4 SHAPE OF HOUSE

TABLE (E) 9A CONCEPT YOU FEEL YOUR CUSTOMERS WOULD DEFINITELY LIKE, MIGHT LIKE, OR WOULD DEFINITELY NOT LIKE IN THE NEW HOMES THEY PURCHASE

		---TYPE OF---				*---ASSETS IN---*			*---CITY---*	
		---INSTITUTION---				*---MILLIONS---*				
						MORT- UNDER 100- 250 HOUS-				
		TOTAL BANKS	S&L'S	GAGE	100	249	PLUS	TON	OTHER	
BASE (NUMBER OF RESPONDENTS)		52	10	18	23	25	11	8	36	16
WOULD LIKE TO HAVE THESE...										
CONCEPT 1	SHADING	44.2	60.0	33.3	43.5	52.0	27.3	62.5	50.0	31.3
CONCEPT 3	NATURAL WIND COOLING	36.5	30.0	38.9	39.1	32.0	45.5	37.5	47.2	12.5
CONCEPT 2	CROSS-VENTILATION	34.6	40.0	33.3	34.8	24.0	27.3	62.5	33.3	37.5
CONCEPT 4	SHAPE OF HOUSE	21.2	-	11.1	39.1	20.0	18.2	12.5	19.4	25.0
DON'T KNOW		11.5	20.0	22.2	-	16.0	18.2	-	5.6	25.0
MIGHT LIKE THESE...										
CONCEPT 2	CROSS-VENTILATION	57.7	50.0	55.6	60.9	68.0	63.6	25.0	61.1	50.0
CONCEPT 4	SHAPE OF HOUSE	40.4	50.0	44.4	30.4	40.0	45.5	25.0	50.0	18.8
CONCEPT 1	SHADING	28.8	20.0	38.9	26.1	29.0	27.3	12.5	30.6	25.0
CONCEPT 3	NATURAL WIND COOLING	28.8	30.0	27.8	26.1	24.0	27.3	37.5	25.0	37.5
DON'T KNOW		7.7	-	11.1	8.7	8.0	9.1	12.5	5.6	12.5
WOULD NOT LIKE THESE...										
CONCEPT 4	SHAPE OF HOUSE	28.8	50.0	33.3	17.4	36.0	18.2	37.5	25.0	37.5
CONCEPT 3	NATURAL WIND COOLING	26.9	20.0	27.8	30.4	32.0	18.2	25.0	27.8	25.0
CONCEPT 1	SHADING	23.1	20.0	22.2	26.1	16.0	36.4	25.0	19.4	31.3
CONCEPT 2	CROSS-VENTILATION	5.8	10.0	5.6	4.3	8.0	-	12.5	5.6	6.3
DON'T KNOW		30.8	20.0	38.9	26.1	28.0	45.5	12.5	38.9	12.5

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••ENERGY CONSERVATION STUDY••

••FINANCIAL INSTITUTION SAMPLE••

TABLE (E) 98 HOW MUCH EACH CONCEPT WOULD ADD TO THE COST OF CONSTRUCTING A NEW HOUSE

		---TYPE OF---		*---ASSETS IN---*		*---CITY---*			
		---INSTITUTION---		*---MILLIONS---*					
		MORT- UNDER 100-		250		HOUS-			
		100 249		PLUS		TON			
		TOTAL		BANKS		S&L'S		GAGE	
		52		10		18		23	
		25		11		8		36	
		16							
BASE (NUMBER OF RESPONDNETS)		52	10	18	23	25	11	8	36
CONCEPT THAT WOULD ADD MOST TO COST...									
CONCEPT 1	SHADING	40.4	50.0	27.8	47.8	40.0	18.2	62.5	38.9
CONCEPT 3	NATURAL WIND COOLING	36.6	30.0	55.5	26.1	32.0	63.6	37.5	38.9
CONCEPT 2	CROSS-VENTILATION	19.2	10.0	11.1	26.1	24.0	9.1	-	22.2
CONCEPT 4	SHAPE OF HOUSE	1.9	-	5.6	-	-	9.1	-	-
DON'T KNOW		1.9	10.0	-	-	4.0	-	-	-
TOTAL		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
CONCEPT THAT WOULD ADD LEAST TO COST...									
CONCEPT 4	SHAPE OF HOUSE	51.9	60.0	50.0	52.2	56.0	27.3	87.5	52.8
CONCEPT 1	SHADING	17.3	10.0	27.8	13.0	16.0	18.2	12.5	16.7
CONCEPT 3	NATURAL WIND COOLING	17.3	10.0	11.1	21.7	16.0	27.3	-	19.4
CONCEPT 2	CROSS-VENTILATION	11.6	10.0	11.1	13.1	9.0	27.2	-	11.1
DON'T KNOW		1.9	10.0	-	-	4.0	-	-	-
TOTAL		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

ENERGY CONSERVATION STUDY

FINANCIAL INSTITUTION SAMPLE

TABLE (E) 9C HOW MUCH EACH CONCEPT WOULD SAVE IN TERMS OF ANNUAL ENERGY CONSUMPTION

	---TYPE OF---				*---ASSETS IN---*			*---CITY---*	
	---INSTITUTION---				*---MILLIONS---*				
	TOTAL	BANKS	S&L'S	GAGE	MORT- 100	UNDER 249	100- 250 PLUS	HOUS- TON	OTHER
BASE (NUMBER OF RESPONDENTS)	52	10	18	23	25	11	8	36	16
CONCEPT THAT WOULD SAVE MOST ENERGY...									
CONCEPT 1 SHADING	44.2	50.0	33.3	47.8	48.0	27.2	37.5	47.2	37.5
CONCEPT 3 NATURAL WIND COOLING	25.0	30.0	22.2	26.1	28.0	27.3	25.0	30.5	12.5
CONCEPT 2 CROSS-VENTILATION	17.3	10.0	22.2	17.4	12.0	27.3	12.5	16.7	18.7
CONCEPT 4 SHAPE OF HOUSE	9.6	-	16.7	8.7	8.0	18.2	12.5	2.8	25.0
DON'T KNOW	3.9	10.0	5.6	-	4.0	-	12.5	2.8	6.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
CONCEPT THAT WOULD SAVE LEAST ENERGY...									
CONCEPT 4 SHAPE OF HOUSE	42.3	60.0	44.4	30.4	48.0	18.2	62.5	50.0	25.0
CONCEPT 3 NATURAL WIND COOLING	26.9	-	33.3	34.8	28.0	36.3	-	22.2	37.5
CONCEPT 1 SHADING	13.5	20.0	5.6	17.4	8.0	27.3	-	13.9	12.5
CONCEPT 2 CROSS-VENTILATION	13.5	10.0	11.1	17.4	12.0	18.2	25.0	11.1	18.7
DON'T KNOW	3.8	10.0	5.6	-	4.0	-	12.5	2.8	6.3
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Section E. Convention/Workshop Attendance

1. Financial officers appear to attend workshops dealing with all aspects of residential dwellings frequently, even more so than builders. Fifty-four per cent of our respondents attended 5 or more such programs in the past 5 years.
2. The modal value with respect to workshop length was 1 day. Among those attending such programs, 1/3 indicated workshops lasting 2 days, and 10% reported workshops of 5 or more days.
3. Most seminars/workshops were in the same city, but 1/4 of our respondents indicated they attended programs 200-299 miles away, and slightly more than 1/4 were held 300 or more miles away.
4. Unlike our builder sub-samples, attendance at such workshops were spread evenly throughout the entire year.
5. Interest in a 1 day workshop was high. Twenty-one per cent of our respondents were extremely interested, 25% very interested and 35% slightly interested.
6. Of those not living in Houston, interest in attending a Houston-based program declined significantly. Sixty-two per cent of these respondents indicated varying degrees of uninterest.

••ENERGY CONSERVATION STUDY••

••FINANCIAL INSTITUTION SAMPLE••

TABLE (E) 5A NUMBER OF TIMES ATTENDED SEMINARS OR WORKSHOPS CONCERNING SUBJECTS RELATED TO THE DESIGN, CONSTRUCTION, FINANCING, AND/OR MARKETING OF SINGLE FAMILY DWELLINGS IN PAST FIVE YEARS

	---TYPE OF---			*---ASSETS IN---*			*---CITY---*		
	---INSTITUTION---			*---MILLIONS---*					
	TOTAL	BANKS	S&L'S	GAGE	MORT- 100	UNDER 100- 249	250 PLUS	HOUS- TON	OTHER
BASE (NUMBER OF RESPONDENTS)	52	10	18	23	25	11	8	36	16
TIMES ATTENDED PAST 5-YEARS...									
NONE	17.3	20.0	22.2	13.0	8.0	27.2	12.5	13.9	25.0
1 TIME	9.6	20.0	5.5	4.4	16.0	-	-	11.1	6.2
2 TIMES	9.6	10.0	11.1	8.7	4.0	9.1	37.5	8.3	12.5
3 TIMES	1.9	-	5.6	-	-	9.1	-	2.8	-
4 TIMES	7.7	10.0	11.1	4.4	-	18.2	12.5	8.3	6.2
5 TIMES	11.6	-	22.2	8.7	16.0	-	12.5	8.3	18.7
6 TIMES	13.5	10.0	5.6	21.7	12.0	18.2	-	16.7	6.3
7 TIMES	-	-	-	-	-	-	-	-	-
8 TIMES	1.9	10.0	-	-	4.0	-	-	-	6.3
9 OR MORE TIMES	26.9	20.0	16.7	39.1	40.0	18.2	25.0	30.6	18.8
NOT REPORTED	-	-	-	-	-	-	-	-	-
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AVERAGE NUMBER OF TIMES PAST 5-YEARS	4.62	4.00	3.83	5.65	5.68	3.91	4.13	4.86	4.06

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ENERGY CONSERVATION STUDY

FINANCIAL INSTITUTION SAMPLE

TABLE (E) 5B HOW LONG SEMINARS/WORKSHOPS LASTED

	---TYPE OF---				*---ASSETS IN---*			*---CITY---*	
	---INSTITUTION---				*---MILLIONS---*				
	TOTAL	BANKS	S&L'S	GAGE	MORT- 100	UNDER 100- 249	250 PLUS	HOUS- TON	OTHER
BASE (ATTENDED SEMINAR/WORKSHOP)	43	8	14	20	23	8	7	31	12
LENGTH OF SEMINAR/WORK SHOP...									
HALF DAY OR LESS	44.2	12.5	57.1	45.0	43.5	37.5	28.6	48.4	33.3
FULL DAY	51.2	50.0	50.0	55.0	47.8	37.5	85.7	51.6	50.0
2 DAYS	32.6	62.5	21.4	30.0	34.8	37.5	28.6	32.3	33.3
3 DAYS	11.6	12.5	14.3	10.0	13.0	12.5	14.3	12.9	8.3
4 DAYS	7.0	-	7.1	10.0	8.7	-	14.3	6.5	8.3
5 OR MORE DAYS	11.6	-	28.6	5.0	8.7	12.5	14.3	12.9	8.3
NOT REPORTED	-	-	-	-	-	-	-	-	-
TOTAL	158.1	137.5	178.6	155.0	156.5	137.5	185.7	164.5	141.7

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••ENERGY CONSERVATION STUDY••

••FINANCIAL INSTITUTION SAMPLE••

TABLE (E) 5C HOW FAR TRAVELED IN ORDER TO ATTEND EACH OF THESE SEMINARS

	•---TYPE OF---•				•---ASSETS IN---•			•---CITY---•	
	•---INSTITUTION---•				•---MILLIONS---•				
	TOTAL	BANKS	S&L'S	GAGE	MORT- UNDER 100	100- 249	250 PLUS	HOUS- TON	OTHER
BASE (ATTENDED SEMINAR/WORKSHOP)	43	8	14	20	23	8	7	31	12
TRAVELED...									
IN SAME CITY	83.7	50.0	92.9	90.0	82.6	75.0	85.7	90.3	66.7
50-99 MILES	7.0	12.5	7.1	5.0	8.7	12.5	-	-	25.0
100-149 MILES	11.6	12.5	7.1	15.0	17.4	-	14.3	-	41.7
150-199 MILES	16.3	12.5	21.4	15.0	21.7	12.5	-	12.9	25.0
200-299 MILES	25.6	50.0	14.3	25.0	30.4	25.0	28.6	25.8	25.0
300 OR MORE MILES	27.9	37.5	14.3	35.0	34.8	12.5	28.6	32.3	16.7
NOT REPORTED/DON'T KNOW	-	-	-	-	-	-	-	-	-
TOTAL	172.1	175.0	157.1	185.0	195.7	137.5	157.1	161.3	200.0

TABLE (E) 5D WHAT MONTHS SEMINARS/WORKSHOPS ATTENDED

	---TYPE OF---				*---ASSETS IN---*			*---CITY---*	
	---INSTITUTION---				*---MILLIONS---*				
	TOTAL	BANKS	S&L'S	GAGE	MORT- 100	UNDER 249	100- 250 PLUS	HOUS- TON	OTHER
BASE (ATTENDED SEMINAR/WORKSHOP)	43	8	14	20	23	8	7	31	12
ATTENDED DURING									
JAN	25.6	-	35.7	30.0	34.8	12.5	28.6	29.0	16.7
FEB	25.6	37.5	21.4	25.0	34.8	25.0	14.3	25.8	25.0
MAR	20.9	25.0	14.3	25.0	26.1	25.0	14.3	22.6	16.7
APR	37.2	25.0	42.9	40.0	43.5	25.0	28.6	38.7	33.3
MAY	25.6	25.0	28.6	25.0	30.4	25.0	14.3	22.6	33.3
JUN	32.6	-	42.9	40.0	39.1	-	42.9	38.7	16.7
JUL	32.6	-	57.1	30.0	43.5	37.5	14.3	38.7	16.7
AUG	34.9	-	35.7	50.0	39.1	25.0	28.6	45.2	8.3
SEP	30.2	25.0	28.6	35.0	34.8	12.5	42.9	29.0	33.3
OCT	30.2	25.0	28.6	30.0	47.8	12.5	14.3	32.3	25.0
NOV	23.3	-	28.6	30.0	39.1	-	14.3	29.0	8.3
DEC	25.6	-	28.6	35.0	39.1	-	14.3	32.3	8.3
NOT REPORTED/DON'T KNOW	16.3	12.5	14.3	20.0	13.0	12.5	28.6	9.7	33.3
TOTAL	360.5	175.0	407.1	415.0	465.2	212.5	300.0	393.5	275.0

••ENERGY CONSERVATION STUDY••

••FINANCIAL INSTITUTION SAMPLE••

TABLE (E) 6A INTEREST IN ATTENDING A ONE-DAY WORKSHOP HELD IN THIS CITY ON ENERGY CONSERVATION IDEAS IN THE DESIGN AND CONSTRUCTION OF SINGLE-FAMILY DWELLINGS AND THEIR ACCEPTANCE BY NEW HOME BUYERS

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	•---TYPE OF---•			•---ASSETS IN---•			•---CITY---•		
	•---INSTITUTION---•			•---MILLIONS---•					
	TOTAL	BANKS	S&L'S	MORT- GAGE	UNDER 100	100- 249	250 PLUS	HOUS- TON	OTHER
BASE (NUMBER OF RESPONDENTS)	52	10	18	23	25	11	8	36	16
DEGREE OF INTEREST IN ATTENDING...									
INTERESTED--EXTREMELY	21.2	20.0	11.1	30.4	20.0	36.3	-	22.2	18.7
INTERESTED--VERY	25.0	30.0	22.2	26.1	36.0	-	12.5	25.0	25.0
INTERESTED--SLIGHTLY	34.6	40.0	38.9	26.1	40.0	27.3	50.0	33.3	37.5
UNINTERESTED--SLIGHTLY	11.5	-	16.7	13.0	-	27.3	25.0	13.9	6.3
UNINTERESTED--VERY	3.8	-	5.5	4.4	-	-	12.5	5.6	-
UNINTERESTED--EXTREMELY	3.9	10.0	5.6	-	4.0	9.1	-	-	12.5
NO OPINION GIVEN	-	-	-	-	-	-	-	-	-
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

020

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TABLE (E) 6C INTEREST IN ATTENDING ONE-DAY WORKSHOP IF IT WERE HELD IN HOUSTON

	-----TYPE OF-----*				*---ASSETS IN---*			*---CITY---*	
	---INSTITUTION---				*---MILLIONS---*				
	TOTAL	BANKS	S&L'S	GAGE	MORT- 100	UNDER 100- 249	250 PLUS	HOUS- TON	OTHER
BASE (DO NOT LIVE IN HARRIS COUNTY)	16	5	6	5	10	4	1	-	16
DEGREE OF INTEREST IN ATTENDING...									
INTERESTED--EXTREMELY	12.5	20.0	-	20.0	10.0	25.0	-	-	12.5
INTERESTED--VERY	6.2	-	16.7	-	10.0	-	-	-	6.2
INTERESTED--SLIGHTLY	18.8	-	-	60.0	20.0	-	-	-	18.8
UNINTERESTED--SLIGHTLY	25.0	40.0	33.3	-	30.0	25.0	-	-	25.0
UNINTERESTED--VERY	25.0	20.0	33.3	20.0	20.0	25.0	100.0	-	25.0
UNINTERESTED--EXTREMELY	12.5	20.0	16.7	-	10.0	25.0	-	-	12.5
NO OPINION GIVEN	-	-	-	-	-	-	-	-	-
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	-	100.0

••ENERGY CONSERVATION STUDY••

••FINANCIAL INSTITUTION SAMPLE••

TABLE (E) 6E WHETHER RESPONDENT WOULD BE THE PERSON WHO ATTENDS THE WORKSHOP

	•---TYPE OF---•				•---ASSETS IN---•			•---CITY---•	
	•---INSTITUTION---•				•---MILLIONS---•				
	TOTAL	BANKS	S&L'S	MORT- GAGE	UNDER 100	100- 249	250 PLUS	HOUS- TON	OTHER
BASE (NUMBER OF RESPONDENTS)	52	10	18	23	25	11	8	36	16
PERSON ATTENDING WORKSHOP WOULD BE...									
RESPONDENT	65.4	70.0	50.0	73.9	80.0	54.5	62.5	69.4	56.2
SOMEONE ELSE	23.1	20.0	38.9	13.0	16.0	36.4	25.0	19.5	31.3
DON'T KNOW/NOT REPORTED	11.5	10.0	11.1	13.1	4.0	9.1	12.5	11.1	12.5
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

C21

ENERGY CONSERVATION STUDY
(Financial Institution Questionnaire)

Hello. I'm _____ with Higginbotham Associates, a marketing and opinion research firm. We are conducting a study to aid in the development of more energy efficient new homes by using better design and construction techniques.

Section A. Energy Shortage

1a. Which of the statements on this card (Card A) best expresses your own opinion of the energy shortage in the United States today?

I definitely believe there is an energy shortage.....1

There seems to be an energy shortage.....2

I really don't think there is an energy shortage.....3

I definitely believe there is no energy shortage.....4

IF CODE 3 OR 4 CIRCLED IN QUESTION 1a, ASK:

1b. Why do you feel there is no energy shortage?

(RECORD ANSWER AND SKIP TO Q3)

2. Now I am going to read a list of factors some people feel are causing or contributing to the energy shortage. Please select the answer from this card (Card B) that best expresses how important you feel each factor is in contributing to the energy shortage. Just read me the number by the answer that best expresses your opinion.

The first factor is...

	<u>ANSWER</u>	<u>DON'T KNOW NO OPINION</u>
a. The world is running out of fuel supplies	_____	X
b. Efforts of environmentalists to prevent pollution	_____	X
c. Waste of energy in design and operation	_____	X
d. Citizens have been wasteful	_____	X
e. American automakers	_____	X

3. We are interested in your opinion about the importance of energy usage. For each item I read, please select the answer from Card B, that best expresses how important you feel the item could be as a potential source of energy savings if efforts were made to make this item more energy-consumption efficient.

<u>ITEMS</u>	<u>ANSWERS</u>	<u>DON'T KNOW NO OPINION</u>
a. Automobiles	_____	X
b. Appliances	_____	X
c. Recycling of packaging and containers	_____	X
d. Residential Dwellings	_____	X
e. Commercial Buildings	_____	X
f. Manufacturing Plants	_____	X

Section B. Finance

1. How important do you feel it is that new homes being built today be designed and constructed in a manner that will conserve energy in the day-to-day operation of the home?
(Card B)

2. What are your major sources of information about the need and/or advantages of building homes that are more efficient in their day-to-day use of energy?

Magazines/Journals.....1

Workshops/Seminars.....2

Conferences/Conventions.....3

Other (SPECIFY).....4

- 3a. Do you make or approve mortgage loans made to persons purchasing new homes?

Yes.....1

(GO TO Q4a)-----NO.....2

- 3b. As I read this list of factors, please tell me how important each one would be in your approval of a mortgage loan.
(Card B)

	<u>ANSWERS</u>	<u>DON'T KNOW NO OPINION</u>
Location of subdivision	_____	X
Builders reputation	_____	X
Quality of construction	_____	X
Applicants' financial status	_____	X
Annual maintenance costs	_____	X
Amount and type of insulation	_____	X
Energy saving design features	_____	X
Average monthly energy cost of the day-to-day operation of the house	_____	X
3c. When making mortgage loans, do you examine and evaluate the monthly costs of energy required to operate the home in relation to the amount of the monthly mortgage payment?		
	All of the time.....1	
	Some of the time.....2	
	Never.....3	
3d. In current practice, just how important are life-cycle cost considerations in the mortgage loan decision process? That is, are heating and cooling costs important factors in mortgage loan decisions for single-family residences? (Card B)		
4a. Do you make or approve interim financing construction loans made to home builders?		
	Yes.....1	
	(GO TO Q5)-----No.....2	
4b. When making interim financing loans to home builders, do you review the design and specifications to make sure that the builder is constructing homes that can be sold?		
	Yes.....1	
	(GO TO Q5)-----No.....2	

- 4c. Do you review the design and specifications to make sure the home will be efficient in their use of energy?
- Yes.....1
No.....2
- 5a. Do you have any written instructions or materials for your people who review loan applications?
- Yes.....1
(GO TO Q6)-----No.....2
- 5b. Do these written instructions cover how to evaluate energy saving features of new home and their influence on the monthly operating budget for the home?
- Yes.....1
No.....2
6. How do you go about evaluating new trends in design and/or construction of single-family housing before making interim financing loans?
READ LIST

- Use own knowledge/judgement.....1
Rely on builders judgement.....2
Ask for independent feasibility study.....3
Other way (PLEASE SPECIFY).....0

-
7. How interested would you be in attending a one-day workshop held in this city on energy conservation ideas in the design and construction of single-family dwellings, their influence on monthly operating costs, and their acceptance by consumers?
(Card F)
-

Section C. Knowledge

1. Now I'm going to read you a list of items that have been suggested by some people as ways to conserve energy in residential dwellings. Please select the answer from Card B that best expresses how important you feel each item would be in conserving energy in a new home.

<u>ITEMS</u>	<u>ANSWER</u>	<u>DON'T KNOW NO OPINION</u>
a. Light colored exterior walls	_____	X
b. Light colored roof	_____	X
c. Insulation of attic and walls	_____	X
d. Size, amount, and location of window space	_____	X
e. Proper lighting design	_____	X
f. Ventilation of attic space	_____	X
g. Location of outside vegetation in the form of trees, shrubs, etc.	_____	X
h. Siting of dwelling on a lot in relation to path of sun	_____	X
i. Shape of building to expose as little wall or roof area as possible to sun	_____	X
j. Natural ventilation of rooms (open windows)	_____	X
k. A large amount of window space that can be shaded in summer and exposed in winter	_____	X
2. Now I would like for you to read the statements on this page of the questionnaire and record your answers by circling the code numbers.		

SECOND QUESTIONNAIRE TO RESPONDENT.

2a. Do you agree or disagree with the following statements:

	<u>Agree</u>	<u>Disagree</u>	<u>Don't Know</u>
a. A single-story dwelling uses less energy for heating and cooling per square foot of area than a two-story house.	1	2	3
b. The natural cover of ground (grass, plants) as opposed to man-made (asphalt, concrete, etc.) tend to stabilize temperatures and decrease extreme variation in temperatures.	1	2	3

	<u>Agree</u>	<u>Disagree</u>	<u>Don't Know</u>
c. For proper natural ventilation, the position of the openings on walls are not important.	1	2	3
d. The effectiveness of a shading device changes according to the position of the sun.	1	2	3
e. A 40% reduction in energy use can be achieved by adding suitable ceiling and wall insulation and storm windows.	1	2	3
f. As the thickness of insulation is increased, you get a corresponding and equal reduction in heat loss or gain.	1	2	3
g. Light colors reflect heat; dark colors absorb heat.	1	2	3
h. Outside shading in the form of overhangs, screen walls, and awnings are approximately twice as efficient as interior shading in the form of curtains, blinds, and shades.	1	2	3
i. Building shapes have little or no effect on energy consumption for building heating and cooling.	1	2	3
2b. Please record the code letter for the answer you feel comes closest to being correct in the space provided.			

RECORD
ANSWERS

- a. Light colored exterior surfaces compared to dark surfaces in the same exposure show temperatures:
A) Lower than B) Same as C) Higher than dark surfaces _____
- b. Horizontal shading devices protect more efficiently around:
A) Southern exposures C) Western exposures
B) Northern exposures D) Eastern exposures _____
- c. Vertical shading devices protect windows or wall openings orientated toward:
A) North/South B) East/West _____

RECORD
ANSWERS

- d. Proper lighting design has the potential of reducing energy consumption for lighting by:
A) 10% B) 30% C) 50%

- 2c. What proportion of the total energy consumed in the United States each year do you estimate is used to heat, cool, and light homes?

_____ %

Section D. Evaluation of Energy Saving Concepts

Now I would like to get your opinion of several design concepts for conserving energy in single-family dwellings. Please look at the concept and read the description, then I will ask several questions. Here is the first design concept.

ROTATE ORDER OF SHOWING CONCEPTS AS FOLLOWS:

Section E.

1. What is your overall opinion of this concept as something you feel new home buyers would like to have incorporated into the design of the next home they purchase? Do you feel they would:

Like it very much.....1

Like it slightly.....2

Dislike it slightly or.....3

Dislike it very much.....4

DON'T KNOW/NO OPINION.....X

2. How do you feel new home buyers would rate the effectiveness of this concept in conserving energy? Do you feel they would rate it...

Extremely effective.....1

Very effective.....2

Not very effective.....3

Not at all effective.....4

DON'T KNOW/NO OPINION.....X

3. What influence, if any, do you feel this concept would have on the total cost of a house build in this city? Please select the answer from Card C that best expresses the influence you feel this concept will have on the total cost of a new house.

- 4a. What influence, if any, do you feel this concept might have on monthly utility bills in the summer time?

- 4b. What influence, if any, do you feel this concept might have on monthly utility bills in the winter time?

- 5a. If a builder asked you to provide his interim financing for houses using this design concept, would the fact that this design concept was being used have a favorable influence, a negative influence, or no influence at all on your decision to provide financing?

Favorable influence.....1

A negative influence.....2

No influence.....3

5b. Why would it have a favorable/negative influence?

6a. Thinking back over the past five years, how many times have you attended seminars or workshops concerning subjects related to the design, construction, financing, and/or marketing of single-family dwellings?

(IF NONE, GO TO Q7)

6b. How long did each of the seminars/workshops last?

_____ Half day or less	_____ 3 Days
_____ Full day	_____ 4 Days
_____ 2 Days	_____ 5 or more days

6c. How far did you have to travel in order to attend each of these seminars?

_____ In same city	_____ 150-199 Miles
_____ 50-99 Miles	_____ 200-299 Miles
_____ 100-149 Miles	_____ 300 or more Miles

6d. And what months did you attend these seminars or workshops?

RECORD NUMBER ATTENDED IN EACH MONTH

Jan _____ 1	Apr _____ 4	Jul _____ 7	Oct _____ 0
Feb _____ 2	May _____ 5	Aug _____ 8	Nov _____ X
Mar _____ 3	Jun _____ 6	Sep _____ 9	Dec _____ Y

6e. Who sponsored the seminars/workshops and what was the general subject?

SPONSORSUBJECT

_____	_____
_____	_____

SPONSORSUBJECT

_____	_____
_____	_____
_____	_____
_____	_____

- 7a. How interested would you be in attending a one-day workshop held in this city on energy conservation ideas in the design and construction of single-family dwellings and their acceptance by new home buyers and the financial community? Please select the answer from Card F that best expresses your degree of interest in attending the workshop--just read me the number.

- 7b. Why do you say that? PROBE AND CLARIFY.

- 7c. ASK IF NOT IN HOUSTON/HARRIS COUNTY:

Suppose the one-day workshop were to be held in Houston, how interested would you be in attending the workshop?

ANSWER _____

- 7d. Why do you say that? PROBE AND CLARIFY.

- 7e. If only one person from your firm was able to attend this workshop, would you be that person or would it be someone else?

Respondent.....1

Someone Else.....2

(Who? Name & Title)

- 8a. Now I would like for you to look at all the concepts again. Please select the ones you feel home buyers in the next few years would definitely like to have in the new homes they purchase, those they might like to have, and those they would definitely not like. RECORD CODES BELOW.

Like to have these concepts... _____

Might like these concepts..... _____

Would not like these..... _____

- 8b. Now I would like for you to place the concepts in the order of how much you feel each concept would add to the cost of constructing a new house--from adding most to adding least. RECORD CODE BELOW

MOST

LEAST

- 8c. This time I would like for you to arrange them in the order of how much energy you feel each concept would save in terms of annual energy consumption. RECORD CODE BELOW

MOST

LEAST

1. RECORD CLASSIFICATION INFORMATION:

Type of Institution

Bank.....1

Savings & Loan Association.....2

Mortgage Company.....3

Size of Institution

Total Assets_____

APPENDIX C

INSTRUCTIONAL DELIVERY SYSTEMS
AND
MATERIALS

A. Instructional Delivery System

The instructional delivery system has been designed to maximize the realization of project objectives. A series of four sessions will be held in three cities, Houston, San Antonio, and Austin. The sessions will occur over a one and one-half month period beginning in January, 1977. Each training session will last approximately six hours and will be facilitated by two three-member instructional teams from architecture, education, and marketing.

The training sessions will utilize small groups with a maximum of fifteen participants for each meeting. There will be eight groups of participants: two groups of builders, two groups of financiers, and four groups of builders and financiers equally mixed. This distribution will provide us with a comparison of two learning environments: one in which builders and financiers learn separately, and one in which they learn jointly. This will give an added dimension to the experimental aspect of the instructional delivery system.

The activities of the training program we have designed focus on the use of passive systems in single-family dwellings as a means of conserving energy. There will be four major areas of concentration in the training

sessions, these corresponding roughly with the four separate days allocated for the sessions. The sessions are as follows:

1. Energy and People: deals with peoples' need for energy to maintain adequate human comfort.
2. Energy and Building Site: concerns the role the site plays in energy conservation.
3. Energy and Building: involves a study of energy flow through the structure and dwellings and the factors influencing that energy flow.
4. Marketing Energy Conserving Design Features: describes possible techniques for marketing energy conserving homes.

The first major area, Energy and People, serves as the basic foundation for all of the remaining training sessions. Three critical topics are covered in this area:

1. The energy problem presents some of the possible reasons for the current energy crisis, and the role the home building industry can play in energy conservation.
2. Human comfort is a topic basic to the total training paradigm. Within this topic we will explore conditions contributing to human comfort, and how these conditions relate to passive design features in single-family dwellings.
3. Climate is the third topic under the heading Energy and People. Regardless of the approaches people take in

seeking adequate human comfort, various climatic conditions must be considered.

The second main area of concentration will be Energy and Site. Training activities in this area are designed to acquaint the participants with some critical issues involved in planning subdivisions. In these sessions we will consider site elements such as ground slopes, vegetation, ground cover, relationship of the buildings to each other, etc., and their effect on air temperature, humidity, and air movement at the living level.

The third major area is Energy and Building. In a practical sense this area is perhaps the most important. The training activities in this area are directed more at the kinds of things that can be done to the structure of a home to conserve energy. We will examine the effects of building materials such as insulation materials on energy consumption. Among other building concerns, we will study the effect of building shapes, orientations, construction, size, locations and design of windows, shading of glass areas, natural ventilation, day lighting, etc.

The last major area, Marketing Energy Conserving Design Features, is two-fold. First, there are training activities designed to teach specific techniques for marketing homes with energy conserving design features. Some of these sessions are designed to teach the participants how to use some marketing materials that we

that we have developed and that will be available to them.

In addition to the special training session on Marketing Energy Conserving Design Features, other marketing techniques will be stressed throughout the training session, all energy conserving techniques will focus on the economic feasibility of very specific design features, for example, shape of buildings, cross ventilation, shading devices, vegetation, insulation, etc. Along with the activities planned for the participants during the training sessions, we have developed some follow-up materials for their use after the training sessions. These materials are designed to inform the prospective home buyers about the energy conserving design features they employ in the homes that they build. The materials will be primarily in the form of pamphlets and slide-tape presentations.

The second and perhaps the most important follow-up service is in providing the participants with economic feasibility analysis. We are designing a computer program which, when provided input data on energy conserving design features being considered for use, will yield information indicating both long and short term cost benefit implications. This service can be obtained by calling our project office at the University of Houston and telling us about the design features being considered in the project. In a day, we will provide the participant with the economic feasibility data available on this issue.

The following is a summary break down of each training session:

Session 1 will involve instructions on:

- a. Program Overview
- b. Energy Problem
- c. Climate
- d. Site

Session 2 will involve instruction on:

- a. Building Envelope and Thermal Phenomena
- b. Sun and Building Shape
- c. Fenestration
- d. Ventilation
- e. Lighting

Session 3 will involve instruction on:

- a. Building Materials and Construction
- b. Overall Design Integration

Session 4 will involve instruction on:

- a. Economics of Conservation Techniques in Homes
- b. Marketing Techniques for Energy Conserving Homes

During the training sessions several modes of instruction will be employed depending on the particular topic being taught. For example, instructions in Human Comfort involves two types of activities. One is an audio-visual instruction on human comfort requiring several minor involvements on the part of the group. The other activity is an educational game which is designed to reinforce the learning which took place during activity one and requires more active involvement than is required in the first activity. And yet, in another example such as Role of Climate the major mode of instruction is an audio-visual presentation requiring minor activities in the form of questions and answers and discussion among the group members. The total instructional delivery system, however, relies more heavily on the use of a dual instructional mode than on one or the other.

At the end of each session, participants will be provided with take-home materials related to some of the topics covered in the training session for later reference. The graphic program for the take-home material designates a major package of the loose leaf binder within which will be four slip cases for each of the major titles in the Home Energy Conservation Learning Package (Energy and People, Energy and Building Site, Energy and Building, and Marketing Energy Conserving Features). Each of these major titles will

have a symbol designation of HEC/1, HEC/2, HEC/3, and HEC/4, to maintain a constant reference symbol for the user and the instructor. Within a major title, there will be the necessary subtitles for that section which will be contained in two to six page booklets to be used by the student and the instructor. Example: in the major title, Energy and People, there are three subtitles - Energy Problem, Human Comfort, and Role of Climate. Each of these subtitles would be a small booklet containing the verbal information and the visual information that went along with that block of information. A typical booklet is illustrated in the Appendix.

We believe that exposure to these vital topics will provide the participants with sufficient information to enable them to begin to make some energy conserving modifications in single-family construction and thereby make a very important contribution in dealing with the energy problem.

B. Instructional Materials

As described in the last section (page 4), the instructional delivery system will use several modes of instruction depending on the complexity of topics.

This section of the report describes the instructional materials being developed on program overview, energy problem, human comfort, role of climate and energy and site.

The participants will be given a program overview using a slide-tape presentation. The presentation will entertain questions and discussion relevant to the program.

The instructional material on energy problem would comprise of a 16mm film presentation based on the script included in this section. This film would also incorporate excerpts from a film titled, "When the Circuit Breaks," produced for the Federal Energy Administration by Concept Films of Washington, D. C.

The instructional material on human comfort has two major activities. The first major activity is comprised of an audio-visual instruction (16mm film) explaining the concept of human comfort. In order to avoid complete passivity several minor activities have been incorporated within it, for example, asking questions and soliciting answers or suggesting discussion among the group members during a deliberate pause in the audio-visual instruction.

The second major activity is an educational game, the objective of which is to reinforce the comprehension of the human comfort concept and the impact of climatic conditions. The game has been described in detail later in this section.

The role of climate will be explained using a slide-tape format. However, as the script would indicate, participants will be required to engage in a few minor activities such as determining comfort conditions within a given set of climatic constraints defined by temperature and humidity during the instructional session itself.

The session on "Energy and Site" will use a dual instructional mode. The participants are provided information regarding the environmental factors that one needs to consider while arranging homes on a site. Second, the participants assume various roles in a game for planning a subdivision. This latter activity will give participants an experience of using the information accumulated earlier in a simulated situation.

The scripts and activities for the above instructional sessions are described in greater detail in the following pages.

Audio Visual Production of Instructional Materials

The Audio Visual Corporation, 2518 North Blvd., Houston, Texas, has been contracted for producing the instructional materials on 16 mm films and wherever possible in slide-tape format from the scripts supplied by the project team. In order to economize the production cost wherever possible, necessary art work and photographic materials are being generated in house to minimize the need for basic material by the contractor.

The completion of audio-visual production is anticipated during the month of September 1976. However, a pilot testing of the instructional material and system will be undertaken during the month of August of this year.

Description of Computer Program Developed to Evaluate the Cost Effectiveness
Of Energy Concepts for Design of Residential Dwellings

This computer program has been developed as an evaluative tool for use by home builders, financiers, designers and others. The program is primarily to offer the participants in the home building industry and consumers a quick and effective method to evaluate the economic impact of energy related design decisions which consists of economic comparisons of energy related modifications in a given design of a typical home. The designer or builder will provide the project office with a detailed list of the various design components of the dwelling indicating dimensions, material selection, estimated costs, orientation, etc. This list will be submitted in response to a questionnaire. The project staff will convert this questionnaire into a computer format and the information will then be run through the computer program. A brief description of this program follows:

The program consists of three parts:

1. The first part of the program is the data file.
this data file covers all environmental loads, initial cost, maintenance cost, etc., of the various material which go into home construction. It covers both wood and concrete types of structure, various finishes, as well as the thickness and thermal resistance of insulating material.
2. The second part of the program develops tables of mensurations. In other words, it takes all of the measurements of the building and corresponding square footage measurement, the "R" value, and the Equivalent Temperature Differential (ETD). These tables are developed for the computation of structural thermal loads.

3. The third part of the program takes developed structural thermal loads and through a number of other responses from the questionnaire, converts the structural thermal loads into an economic base. This is done by taking the number of BTU's needed per month for heating and cooling as well as yearly totals. Based on the efficiency of the equipment used in the building, the amount of infiltration, number of people, lighting and so on, it computes a total demand in BTU's. This demand is then converted into the annual cost of energy for heating and cooling the home.

The catalog and material selections correspond with the data file, so as the contractor, builder, or designer goes to the catalog of material and selects the design details and/or materials he desires to incorporate in the home, there is a corresponding file within the program which is the data file and it contains all the information necessary for the computation of thermal loads and economic feasibility. Restated, the catalog of material selection corresponds with the data file and provides the computer program with a complete set of data for the input design. If a particular construction detail is identified, with the help of the questionnaire, the program will retrieve a set of data from the data file regarding that particular material. On this basis, the material relative to energy use is identified on the table of mensurations developed.

For the purposes of computation of initial cost and maintenance cost the Dodge Construction Estimator was used. It uses unit cost of square foot. When the unit cost is multiplied by the number of square feet of material selected, the result is the total cost for the selected material.

Throughout the program the "U" value for a particular material is multiplied by the difference in temperature and this is then multiplied by square footage which will give BTU loss for a given material. The Trane Manual was used for summer thermal loading and it used ETD which was then multiplied time "U" value of that given material. Within the computer program ETD and "U" value are already multiplied and fed into the computer base. The combined figures, multiplied by the square footage would then give summer BTU's -- heat gain. In addition, all of the solar load data are in the form of BTU's per day in the winter and BTU's per hour in the summer were drawn from the Trane Manual which was used for this information. From the mensuration table a running total is developed in the program for specific areas. As the program steps through four running totals are developed:

1. initial cost of materials related to energy use;
2. maintenance cost of materials which are related to energy . This maintenance cost is computed on a yearly basis;
3. the third figure that is run all the way through the program and totals as the program progresses, is winter thermal load and
4. the fourth column is summer thermal load.

As the data retrieval is accomplished, the figures are multiplied by the corresponding variants of square footage which corresponds to the selected material. As each selection is completed, the outcome is added to the total.

Totals are arrived at for all four areas mentioned above. Going back over the four items just mentioned, we will explain what they are:

1. the total for number 1, which is initial cost -- this represents the initial investment for all materials in the

designed home which directly affect the use of energy for heating and cooling. In other words, if a particular material is calculated in terms of "U" value or ETD in arriving at a thermal load, the initial cost is given on that material;

2. Number 2, which is maintenance cost -- represents costs which are necessary to maintain the designed home; those materials which directly affect energy use, in terms of heating and cooling;
3. The third figure which we have run a total on, is representative of the maximum winter structural load in BTU's per hour to maintain comfort levels within the home. Basically, this is the same way as it is computed by an air conditioning person who is designing the system. The table and the method used are the development of a mensuration table and again it figures the winter structure to the maximum condition;
4. Computation Number 4 above is, again, the same as the winter load but it represents the maximum summer structural load and BTU's per hour to maintain comfort levels within the home.

At this point in the program structural loads of number 3 and number 4 which are the maximum winter and maximum summer loads are converted into actual loaded conditions through the addition of loads for lighting, people, and air infiltration. This is again using standard figures for people. For this purpose, the standard figures for people was derived by using the number of bedrooms and adding one person. In other words, if there was a three bedroom house, we assumed four people would be living there. Four people times the typical BTU's per hour, per person, of heat gain were calculated. Air infiltration was based on whether the home

had a fireplace, the actual climate conditions which exists in Houston and also weather stripping of the windows, and so on. This is computed again through ASHRAE's method of loads due to air infiltration. The method used for the winter infiltration was based on cubic footage and the summer load was based on the square footage of exterior walls. In order to provide the economic information necessary for this program, a number of formulae were used based on the climatic information of degree days. What is given is the number of degree days for heating and cooling; the number of degree days per month and these are all placed into the initial data file.

In order to calculate operation costs for the studied residential designs the following formulae were used: *

1. Calculation of Heating Requirement/Degree Days

$$\frac{(HL \times 24)}{th} - SG = HRDD$$

When: HRDD = Heating requirement/degree days in btu's
 HL = Computed heating load in btu's per hour
 *SG = Daily solar heat gain transmitted
 th = Degree difference computed in heating load calculation

*Solar gain is allowed in this calculation as it will be available on a daily basis during heating periods, but will not show up in computation for heating load, as maximum condition occurs at night when solar gain is not available.

2. Calculation of Cost of Heat

$$HC = \frac{HRDD \times MDDH}{3413} \times P$$

When: HC = Heating costs
 HRDD = Heating requirements/degree days in btu's
 MDDH = Monthly total degree days heating
 3413 = Conversion factor from btu's to kilowatt hours
 P = Price per kilowatt hour in dollars

* R. K. Banerji and George Way, "Effect of Climatic Factors on Housing Cost", in Proceedings of IAHS International Symposium on Housing Problems 1976, ed. Parviz F. Rad et.al., pp. 1432-33.

3. Calculation of Cooling Requirement/Degree Day

$$CRDD = \frac{DL \times 24}{tc}$$

When: CRDD = Cooling requirement/degree day in btu's
 CL = Computed cooling load in btu's per hour
 tc = Degree difference computed in cooling load calculation

*Note: Solar gain is not considered in this calculation as maximum conditions occur during the day and therefore solar gain is computed for cooling load.

4. Calculation of Cost to Cool

$$CC = \frac{CRDD \times MDDC \times P}{ER \times 3413}$$

When: CC = Cooling costs
 CRDD = Cooling requirements/degree day in btu's
 MDDC = Monthly total degree days cooling
 ER = Efficiency ratio of cooling unit
 3413 = Conversion factor from btu's to kilowatt hours
 P = Price per kilowatt hour in dollars

Data used for degree days heating and degree days cooling were derived from a 30-year average (1941-1970) compiled by the National Oceanic and Atmosphere Administration.

For the heating cost and cooling cost developed from the formulae listed above a month by month cost table was developed for a given design that is accomplished by multiplying the heating cost by the monthly degree days in heating and cooling costs times the monthly degree days of cooling costs. Again, the computer program is based on the 30-year average from the weather bureau here in Houston. The operating costs on a yearly basis estimates selling cost and life cycle cost.

The individual filling out the questionnaire provides an estimated selling cost for the original designed home. Based on this figure, a new estimated selling cost is computed for the altered design. This

new selling cost is computed on the basis of a number of assumptions: it is assumed that the original inputed design has an established selling cost. That the design changes incorporated to lower energy use and that the cost of the designed home would remain constant except the specific changed item. In other words, if the inputed design for the original has a single plated window, and you use the exact design but you want to put in double plated glass, then all cost will remain constant except that one item that you changed (the window), therefore, the cost of the item you changed is subtracted from the original selling price; and the result is the new selling price.

Maintenance figures were run the same way as the selling price. As you change a selection the cost of the item changed is subtracted from the original cost of that material and in its place the new cost of maintenance of the new material is inputed. The result of this process is a new maintenance cost.

Life cycle cost is developed for the original design and each design change provided in the questionnaire. This is accomplished by adding the basic total yearly cost, principal, interest, maintenance and operation. The yearly figures for maintenance and operation have already been discussed and they are already in the computer program as a summation process. It is just a matter of retrieving them since they too have been computed.

The formulae used for this process are listed below:*

$$d = \frac{r (1 + r)^n}{(1 + r)^n - 1}$$

When: d = debt service constant
 r = interest rate
 n = length of loan in years

* for C.W. Griffin, Jr., Energy Conservation in Buildings: Techniques for Economical Design, The Construction Specification Institute, p. 165.

$$YPI = T \times d$$

When: T = total selling cost
d = debt service constant
YPI - yearly principal and interest

The summation of the yearly principal and interest with yearly operating and maintenance costs will equal the life cycle cost. This figure represents the cost the consumer will pay per year to operate, maintain and pay for a given home or design. One of the things that will be done on the program is to provide a summary page and this summary page will be utilized at the beginning.

Starting with the computer print-out, which will be returned to the person filling out the questionnaire, it will give the estimated selling cost of the home, then a chart will be developed which is month by month heating cost, cooling cost, and total heating and cooling costs for the original design and each design change submitted up to three changes.

Secondly, the summary page will compute a single ventilation figure. This figure is provided by responses on the submitted card which gives the percent of ventilation utilization in a given design. For example, if it is a design that regardless of whether the windows are open allows for very little air to pass through the dwelling, the design will have very little savings. If it is a house that is well designed for ventilation, where when the windows are open and air passes through and reaches all the rooms and spaces within the dwelling, then you have a maximum amount of ventilation.

Stated on the computer program of the evaluation base for air ventilation is a possible figure or possible percentage of cooling costs which can be reduced if the consumer takes advantage of the ventilation that results from a well designed home.

The final figure on the print-out for each design, either original or changes, is life cycle cost per year per design. This is the total amount which will be paid out by the consumer for operation, maintenance, principal and interest on the designed home. A print-out is given for each design. On the summary sheet, a brief explanation of what life cycle cost is and, using the original and changes submitted, orders them in response to life cycle costs and gives the case number. From the table developed, you can tell which (design option) is the most cost-effective in terms of the life cycle cost. This information is given on the last page.

SUMMARY

THE ORIGINAL DESIGN AND CHANGES WHICH YOU HAVE PROVIDED ARE LISTED AND ORDERED BELOW ACCORDING TO ENERGY RELATED LIFE - CYCLE COSTS PER YEAR. LIFE - CYCLE COST PER YEAR REPRESENTS A COMPOSITE VALUE WHICH INCLUDES THE PRINCIPAL AND INTEREST FOR THE INITIAL MORTGAGE OF THE HOME, YEARLY MAINTENANCE OF ENERGY RELATED MATERIALS, AND THE YEARLY OPERATING COST TO HEAT AND COOL THE HOME. LIFE - CYCLE COSTING PROVIDES A GOOD MEASURE FOR THE EVALUATION OF ENERGY DESIGN DECISIONS IN THAT IT REPRESENTS AN APPROXIMATE FIGURE EQUAL TO WHAT THE CONSUMER WILL SPEND PER YEAR FOR A PARTICULAR HOME. IF AN ENERGY RELATED DESIGN CHANGE CAUSES AN INCREASE IN THE INITIAL COST OF THE HOME, THE INCREASED YEARLY PRINCIPAL AND INTEREST MUST BE OFF SET BY REDUCED YEARLY OPERATING AND MAINTENANCE COSTS. IF THIS IS ACHIEVED, THE CONSUMER WILL SAVE MONEY THROUGH THE DESIGN CHANGE.

COMPARATIVE ANALYSIS

!	! LIFE !
!	! CYCLE !
!	! COST !

!	0 ! 4424.85 !
!	3 ! 4429.38 !
!	2 ! 4437.72 !
!	4 ! 4441.20 !
!	1 ! 4445.65 !

FOLLOWING IS AN ITEMIZED ECONOMIC DATA SHEET FOR THE ORIGINAL AND EACH OF THE CHANGES YOU HAVE SUBMITTED.

OPTION CASE C

THE ESTIMATED SELLING PRICE OF THIS HOME IS \$ 36460.00 .

MONTH	HEATING COST (\$)	COOLING COST (\$)	TOTAL COST (\$)
JANUARY	46.93	1.65	48.58
FEBRUARY	33.17	2.26	35.43
MARCH	21.37	6.07	27.39
APRIL	2.59	15.95	18.55
MAY	.01	34.40	34.40
JUNE	.00	49.72	49.72
JULY	.00	58.36	58.36
AUGUST	.00	58.67	58.67
SEPTEMBER	.00	43.85	43.85
OCTOBER	2.71	21.31	24.01
NOVEMBER	17.49	3.91	21.40
DECEMBER	37.57	1.13	38.70
YEARLY	161.77	297.36	459.13
TOTAL			

IF THE CONSUMER TAKES ADVANTAGE OF THE VENTILATION WHICH THIS PLAN PROVIDES THE YEARLY OPERATING COST WILL BE REDUCED TO \$ 435.82 . AMOUNTING TO A SAVINGS OF \$ 23.31 PER YEAR.

LIFE CYCLE COST PER YEAR OF THIS DESIGN EQUALS \$ 4424.85 .

OPTION CASE 1

THE ESTIMATED SELLING PRICE OF THIS HOME IS \$ 36460.00 .

! MONTH	! HEATING	! COOLING	! TOTAL
! COST (\$)	! COST (\$)	! COST (\$)	
! JANUARY	! 46.93	! 1.07	! 48.00
! FEBRUARY	! 33.17	! 2.57	! 35.74
! MARCH	! 21.32	! 6.09	! 28.21
! APRIL	! 2.59	! 18.11	! 20.71
! MAY	! .00	! 39.14	! 39.14
! JUNE	! .00	! 56.44	! 56.44
! JULY	! .00	! 66.25	! 66.25
! AUGUST	! .00	! 66.60	! 66.60
! SEPTEMBER	! .00	! 49.78	! 49.78
! OCTOBER	! 7.71	! 24.19	! 26.89
! NOVEMBER	! 17.49	! 4.44	! 21.93
! DECEMBER	! 37.57	! 1.29	! 38.85
! YEARLY	! 161.77	! 337.56	! 499.33
! TOTAL	!	!	!

IF THE CONSUMER TAKES ADVANTAGE OF THE VENTILATION WHICH THIS PLAN PROVIDES THE YEARLY OPERATING COST WILL BE REDUCED TO \$ 472.97 . AMOUNTING TO A SAVINGS OF \$ 26.47 PER YEAR.

LIFE CYCLE COST PER YEAR OF THIS DESIGN EQUALS \$ 4465.05 .

OPTION CASE 2

THE ESTIMATED SELLING PRICE OF THIS HOME IS \$ 36955.00 .

MONTH	HEATING COST (\$)	COOLING COST (\$)	TOTAL COST (\$)
JANUARY	43.95	1.50	45.45
FEBRUARY	31.06	2.06	33.12
MARCH	17.77	5.52	25.49
APRIL	2.43	14.49	16.92
MAY	.00	31.33	31.33
JUNE	.00	45.17	45.17
JULY	.00	53.02	53.02
AUGUST	.00	53.30	53.30
SEPTEMBER	.00	39.84	39.84
OCTOBER	2.54	19.36	21.89
NOVEMBER	16.38	3.55	19.93
DECEMBER	35.18	1.03	36.21
YEARLY	151.51	270.16	421.67
TOTAL			

IF THE CONSUMER TAKES ADVANTAGE OF THE VENTILATION WHICH THIS PLAN PROVIDES THE YEARLY OPERATING COST WILL BE REDUCED TO \$ 400.49 . AMOUNTING TO A SAVINGS OF \$ 21.18 PER YEAR.

LIFE CYCLE COST PER YEAR OF THIS DESIGN EQUALS \$ 4437.72 .

OPTION CASE 3

THE ESTIMATED SELLING PRICE OF THIS HOME IS \$ 36992.95 .

! MONTH	! HEATING	! COOLING	! TOTAL
! COST (\$)	! COST (\$)	! COST (\$)	
! JANUARY	! 46.93	! 1.17	! 48.10
! FEBRUARY	! 33.17	! 1.61	! 34.78
! MARCH	! 21.32	! 4.32	! 25.64
! APRIL	! 2.59	! 11.34	! 13.94
! MAY	! .03	! 24.51	! 24.51
! JUNE	! .00	! 35.34	! 35.34
! JULY	! .00	! 41.49	! 41.49
! AUGUST	! .00	! 41.71	! 41.71
! SEPTEMBER	! .00	! 31.17	! 31.17
! OCTOBER	! 2.71	! 15.15	! 17.86
! NOVEMBER	! 17.49	! 2.78	! 20.27
! DECEMBER	! 37.57	! .60	! 38.37
! YEARLY	! 161.77	! 211.41	! 373.18
! TOTAL	!	!	!

IF THE CONSUMER TAKES ADVANTAGE OF THE VENTILATION WHICH THIS PLAN PROVIDES THE YEARLY OPERATING COST WILL BE REDUCED TO \$ 356.60 .
AMOUNTING TO A SAVINGS OF \$ 16.57 PER YEAR.

LIFE CYCLE COST PER YEAR OF THIS DESIGN EQUALS \$ 4429.38 .

OPTION CASE 4

THE ESTIMATED SELLING PRICE OF THIS HOME IS \$ 37487.95 .

! MONTH	! HEATING	! COOLING	! TOTAL
! COST (\$)	! COST (\$)	! COST (\$)	!
! JANUARY	! 43.95	! 1.13	! 45.08
! FEBRUARY	! 31.06	! 1.55	! 32.61
! MARCH	! 19.97	! 4.15	! 24.12
! APRIL	! 2.43	! 10.90	! 13.33
! MAY	! .00	! 23.56	! 23.56
! JUNE	! .00	! 33.97	! 33.97
! JULY	! .00	! 39.87	! 39.87
! AUGUST	! .00	! 40.08	! 40.08
! SEPTEMBER	! .00	! 29.96	! 29.96
! OCTOBER	! 2.59	! 14.56	! 17.09
! NOVEMBER	! 16.38	! 2.67	! 19.05
! DECEMBER	! 35.18	! .77	! 35.96
! YEARLY	! 151.51	! 203.16	! 354.67
! TOTAL	!	!	!

IF THE CONSUMER TAKES ADVANTAGE OF THE VENTILATION WHICH THIS PLAN PROVIDES THE YEARLY OPERATING COST WILL BE REDUCED TO \$ 338.74 . AMOUNTING TO A SAVINGS OF \$ 15.93 PER YEAR.

LIFE CYCLE COST PER YEAR OF THIS DESIGN EQUALS \$ 4461.20 .

APPENDIX D

PILOT TESTING
OF INSTRUCTIONAL MATERIALS

Pilot Testing

RATIONALE:

The pilot testing of the training program materials and processes was conducted for formative purposes only. We were not directly concerned with the probability of the program changing builders and financiers attitudes and/or behavior. The kinds of formative information sought provided valuable direction to the project staff in further development and refinement of the training program. The pilot testing was designed to examine closely scope and sequence of the content, relative to the degree of knowledge already possessed by builders and financiers, the probable utility of the curriculum materials as a training program and a general reaction to the training program. More specifically, the pilot test of the training program and materials provided formative information relative to the following general areas of concern:

1. A general reaction to the materials and program. After having been exposed to the training program, the pilot participants were asked to provide a general perception of the training program. We were hoping to ascertain the respondents general psychological response to the training program, both in terms of their understanding of the materials and ideas cognitively, and their attitudes and/or feelings about the program's contents and processes. In addition to obtaining the pilot participants perceptions of the program, we also attempted to ascertain what the participants believe to be their peer's perceptions of the

program (in a speculative sense).

2. Whether there are parts of the training program that are even necessary. We wondered whether there were parts of the program that were commonly understood and thus not a necessary part of the training program. A sub-function of this issue was to provide an indicator of the amount of knowledge already possessed by the target population.

3. To ascertain whether the knowledge level of the material in the training program was too difficult or too easy for the target population.

4. To determine if the training program content was logically sequenced and that the target population could see the relatedness of the material sequence.

5. To ascertain what, if any, adaptations should be made in the material such that both builders and financiers can benefit from going through the training program.

6. To provide some indication of the builders and financiers inclination toward implementing the ideas in home building and marketing. Our primary interest in this area was the kinds of efforts builders and financiers would make to implement the ideas.

NOTE: The program has been designed to be implemented without any intervention by the project staff. However, in the external evaluator's view human intervention, such as provided by a trained facilitator, would be desirable.

7. To provide some indication regarding builders' and financiers' inclination toward implementing the ideas in building homes and marketing them. Our primary interest in this area was the kinds of efforts builders and financiers would make to implement the ideas.

SAMPLE:

The pilot test of the curriculum materials required the purposive selection of three builders and three financiers.¹

These people were carefully selected in order to maximize the kinds of formative evaluation information needed in the final production of a usable training program. The pilot participants were selected based on the following criteria:

a. Representative of the target population for the training program in terms of kinds and numbers of homes they build or finance;

b. Possess sufficient knowledge regarding the concepts and ideas contained in the training program to allow them to provide usable feedback.

c. The pilot sample represented in part, the beginning of the dissemination of the training program, and they were chosen with that in mind. As such, these participants were relatively good public relations people.

¹While the original proposal specified a sample of fifteen builders and financiers, it was decided, after consultation with Dr. Duncan, the external evaluator, that the sample specified above would be more beneficial. We believe that the kind of information need in the pilot test is very detailed, descriptive formative feedback. Thus, the change in terms of the sample.

Procedures for Collecting Pilot Test Data

The pilot test participants were selected by the project director three weeks prior to the data collection period. They were hired on a contractual basis. The participants were informed of the nature of the task and the general kinds of information we hoped to obtain from them.

The data collection period of the pilot test was three days spread over a three-week period.² During those three days the pilot participants were asked to react to various components of the training program in two-to-three hour sittings.

During each session of the data collection period, all of the participants met collectively with principle investigators of the project. The project staff was present to react to any questions and concerns, and to operate the equipment. At no time did their presence seem to interfere with the quality of feedback given by the consultants. At the beginning of each data collection session, the pilot participants were given a set of materials for use as guides in providing their reaction. The first of these materials was a General Discussion Guide Sheet. (See Attachment #1)

²This period was reduced from the four days specified in the proposal (see Quarterly Report #4) when the project staff determined that the consultants were able to move through the materials much quicker than anticipated, while providing the same high feedback desired.

The participants were to view program components and, using the guide sheet as a stimulus for discussion, discuss among themselves their reactions to the component they were proceeding through. In addition to providing their own perceptions of the program components, they were to discuss how they felt their colleagues in the building industry would react to the program component.

After the pilot participants proceeded through a program component, they were then to provide their individual reaction to the component using a Component Questionnaire included in their packet of materials (See Attachment #2). This reaction they were to provide without further discussion with other pilot participants.

At the conclusion of the final pilot testing session, the participants were asked to provide their general reaction to the total program.³ This reaction was obtained during a group discussion focused on a critique of the total program. This discussion was audio taped with the tapes being analyzed for significant information relative to changes that were needed prior to implementing the program with the target population.

³This also represents a departure from the proposal for the pilot testing (See Quarterly Report #4). We felt that the discussions following each session were free, open, and informative. With this being true, we decided to attempt this process to obtain the overall feedback. We found this to be quite successful and decided to eliminate the written report.

Instrumentation:

A questionnaire was developed to obtain feedback from the pilot testing participants. The instrument contained both open end questions, as well as several likert-type questions. The instrument was developed by project staff with further refinement being suggested by the external evaluator.

Results

The results of the pilot testing yielded two basic kinds of data. Qualitative statements regarding the material and some desirable modifications in the program components constituted one kind of data. A second was the scores obtained in the Likert items.

Table 1 is a report of the Likert items responses. Reading across the top of Table 1 there are eleven columns representing the eleven program components the pilot population was asked to critique. Also across the top are the letters "M" and "O". The "M" represents how the pilot participant would personally react to an item; and the letter "O" represents how the pilot participants believes one of his/her colleagues would react to the item. Reading down the left side of the table are the separate items on the questionnaire. The figures in the table are mean scores on each item. A single line under an item mean represents a desired response on a question. A double line indicates that the response was in the desired direction for that item.

TABLE 1
Average Response to Energy Study Questions
(N=6)
Scales (1-4 items)

	Human Comfort		Climate		Penetration		Building Envelope		Site		Sun and Building Shape		Ventilation		Lighting		Materials		Design		Marketing	
	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O
1. I had a clear understanding of what was expected of me as I proceeded through the component.	1.83	1.83	2.50	2.50	2.00	2.00	2.00	2.00	2.16	2.16	2.20	2.20	2.00	2.00	2.40	2.40	2.20	2.20	2.00	2.00	2.00	2.00
2. Estimate the degree to which you already possess the skills, abilities and understandings presented in this component prior to proceeding through the component.	1.83	1.83	1.67	1.63	2.33	2.17	2.83	3.00	2.17	2.17	2.67	2.67	2.17	2.17	2.17	2.17	2.00	1.00	2.17	2.17	2.17	2.17
3. The learning activities presented in the component were sufficient for my attaining the skills, abilities and understandings as stated in the objectives.					2.00	2.00	1.83	1.83	1.83	1.83	2.25	2.25	1.67	1.67	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.50
4. The learning activity was an enjoyable experience.	2.00	2.33	2.00	2.00	2.00	2.00	2.33	2.50	2.00	2.00	2.17	2.17	2.33	2.33	2.00	2.00	2.00	2.20	2.00	2.17	2.67	2.67
5. When I needed help, someone was always available to assist me.	1.83	1.83	1.60	1.60	1.83	1.83	2.00	2.00	1.83	1.83	1.83	1.83	1.80	1.80	2.00	2.00	2.00	2.00	1.75	1.75	2.00	2.00
6. Specific instructions concerning the location of instructional materials (films, film strips, books, articles, etc.) were clear and easy to follow.					2.00	2.00	2.00	2.00	2.00	2.00	2.33	2.33	2.00	2.00	2.25	2.25	2.25	2.25	2.00	2.00	2.25	2.25
7. In terms of helping me better understand and work with building/financing energy conserving homes, I would rate this component extremely good.	2.50	2.50	2.17	2.17	2.00	1.83	2.17	2.17	2.17	2.17	2.50	2.50	2.83	2.83	2.67	2.67	2.17	2.17	1.83	1.83	2.00	2.00
8. I became bored as I progressed through the component.	2.33	2.33	3.17	3.17	3.50	3.50	2.33	2.33	3.00	3.00	2.83	3.00	2.67	2.67	2.67	2.67	3.00	3.00	2.67	2.83	2.60	2.60

M: My opinion

O: My colleagues opinion

Desired Response on question

Desired Response direction on question

TABLE 1 con't

Average Response to Energy Study Questions
(N=6)

Scales (1-4 items)

	Human Comfort		Climate		Penetration		Building Envelope		Site		Sun and Building Shape		Ventilation		Lighting		Materials		Design		Marketing	
	N	O	N	O	N	O	N	O	N	O	N	O	N	O	N	O	N	O	N	O	N	O
9. The information presented in the component was relevant to my personal needs as a builder/financier.	3.00	3.00	2.50	2.50	1.83	1.83	2.33	2.33	2.33	2.33	2.17	2.17	2.50	2.50	2.17	2.17	2.00	2.00	1.83	1.83	2.00	2.00
10. In the homes I build, I would implement the following percentage of the ideas presented in this component.	3.17	3.33	3.00	3.17	2.17	2.00	2.33	2.33	2.50	2.67	3.00	3.00	3.17	3.17	3.17	3.33	2.00	2.00	2.00	2.00	1.40	1.40
11. I would favor the financing of a home which was built implementing the concepts and ideas presented in this component.	2.50	2.50	2.00	2.20	1.60	1.60	2.17	2.17	2.00	2.00	1.83	1.83	3.17	3.33	2.67	2.83	1.80	1.80	1.83	1.83	1.80	1.80
12. I would be interest in building a home which employed the energy savings features presented in this component.	2.20	2.20	2.17	2.33	1.67	1.67	2.17	2.17	2.00	2.00	1.67	1.67	2.83	2.83	2.17	2.33	1.83	2.00	1.83	2.00	1.80	1.80
13. More activities were needed to help me reach the specified objectives.													2.50	2.50	2.25	2.25	2.50	2.50	2.25	2.25	2.25	2.25
14. This component was a waste of my time.	2.67	2.50	3.00	3.00	3.33	3.33	2.83	2.83	3.17	3.17	3.17	3.17	2.83	2.83	3.00	3.00	3.00	3.00	3.17	3.17	2.83	2.83
15. The component has possibilities but needs revision.	1.67	1.67	2.17	2.17	3.20	3.20	2.17	2.17	1.83	1.83	2.50	2.50	2.33	2.33	2.17	2.33	2.50	2.50	2.67	2.67	2.40	2.40
16. Some of the materials in this component were too difficult to be easily understood.	2.50	2.50	2.50	2.33	2.67	2.67	2.33	2.33	2.67	2.67	2.33	2.50	3.17	3.17	2.80	2.60	2.20	2.20	3.00	3.00	2.67	2.67
17. I felt that the activities in this component took too long to complete.					3.00	3.00	2.60	2.60	3.00	3.00	2.60	2.60	2.80	2.80	2.80	2.80	3.00	3.00	2.75	2.75	2.80	2.80

N: My opinion

O: My colleagues opinion

Desired Response on question

Desired Response direction on question

TABLE 1 cont.
Average Response to Energy Survey Questions
(N=6)
Scales (1-4 items)

Human Comfort		Climate		Fenestration		Building Envelope		Site		Sun and Building Shape		Ventilation		Lighting		Materials		Design		Marketing	
M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O	M	O
				2.00	2.00	2.00	2.00	2.00	2.00	2.40	2.40	2.40	2.40	2.25	2.25	2.60	2.60	2.00	2.00	3.00	3.00

18. Instructions for the activities in this component were clearly specified and allowed me to progress through the activities with minimal difficulty.

19. Could you use the ideas presented in this component to help you sell a home to a consumer?

M: My opinion
O: My colleagues opinion

— = Desired Response on question
— = Desired Response direction question

TABLE 2

SUMMARY OF COMMENTSHuman Comfort

- a more clear definition of and description of "comfort zone" is needed.
- there were no new ideas presented
- there was not enough convincing information
- the ideas presented are not sufficient to influence purchase
- human comfort is an individual factor
- more detail is needed on graph presentations
.....perhaps animation
- restrictive items prevent application; land use, subdivision limitations, marketability, cost.

Climate

- would not be a determining factor in purchase public is interested in how conditions can be solved at what cost, not how conditions are created
- information is useful
- ideas are not new; not practical
- there were no real suggestions
- this would be difficult to apply in a sales situation without collateral materials
- ideas could be used in sales materials.

Fenestration

- if a home had actually been designed and situated, then built as suggested, there would be much to describe that would pass as an advantage to the home owner/user
- work closely with planners to locate windows and openings to get maximum savings with proper use and sealing
- the publicity already available makes it easier to show the value of energy saving features here.

The Building Envelope

- cost saving must be emphasized here.

Site and Energy

- point out the positive features of energy saving facts with respect to site, location and vegetation
- show the home buyer the layout to give him the best results regarding heating and air conditioning
- cost and location are of more interest than individual site unless hard cost savings can be shown.

Sun and Building Shape

- proper planning is needed
- emphasize savings passed on to home buyer through the cost of utilities
- the technical nature requires integration with other features; this is of little value by itself.

Ventilation

- not applicable in this climate
- it is unlikely that a customer would consider natural ventilation in Houston to be a valid concept
- it is useful to present savings during the times of the year when heat and air conditioning are not used.

Lighting

- insufficient savings in Houston area due to energy loss through windows
- placement of windows is a useful idea
- uncertainty as to whether natural lighting is a positive feature to customers in relation to the tangible features that they pay for
- there is some question as to the accuracy of the data, or the accuracy of application of the data
- it is useful to indicate to clients the steps that have been taken to conserve energy.

Materials

- the general public needs to be more aware of the the types of materials available and their specific use in energy and conservation.
- energy saving can help to sell a home
- materials are tangible items that could be demonstrated to buyers.
- perhaps the data did not fit the popularly used materials or the popular price ranges.

In the paragraphs to follow in the results section we will discuss each pilot testing objective by relating applicable data from Tables 1 and 2.

In Objective #1 we sought a general reaction to the materials in the training program. The data in Table 1 indicate that item-by-item, overall components, the participants were very favorable toward the program components. The responses to the questionnaire were in the desired direction well in excess of 75% of the time with only items number 2 and 15 being consistently in the undesired direction. No one component reported in Table 1 seemed to stand out as being undesirable. However, one component (The Energy Problem) not presented in Table 1 was reacted to as consistently undesirable and as such was eliminated from the program.

In addition to obtaining the pilot participants' perceptions of the program components, we also sought, through Objective #1, to ascertain how the participants believed their colleagues' reactions would be almost identical to theirs. In only a very few instances were there differences in the two responses.

A second major concern of the project staff was whether there were parts of the program which were already so commonly known and understood that they were not needed in the program. Specifically, Objective #2 raised the issue of "whether there are parts of the training program that aren't even necessary". As indicated above, the pilot participants reacted negatively to the "Energy Problem"

Design

- for those with a real concern, most would want to know, "can I afford it?" "will it suit my needs?" "is it the location I want to live in?"
- ideas useful for clarification
- energy conservation is a necessary concern to any home buyer and eventually will become a major factor.

Marketing

- third party testimonials are more convincing than statistics
- some good survey data; graphic presentation could be used.
- use of facts and knowledge of consumers shows real needs.
- useful in that the proper presentation of facts and materials is unavailable to the general public.

component. This reaction was based on the assumption that the so-called "energy crisis" is already so much a part of our everyday lives that spending program time on the issue is redundant.

There were a few qualitative statements reported in Table 2 in which it was reported that certain components (Climate and Human Comfort) presented data already commonly known, therefore, of little use. The data in Table 1 item #3 seem to indicate that most of the pilot participants already possessed the knowledge presented in the program components. However, the responses to item #9 indicate that the pilot participants viewed the material to be very relevant to their personal needs as builders and/or financiers; and, the responses to item #14 suggest that they did not view participating in the program components to be a waste of their time.

Objective #3 concerned with the relative difficulty of the knowledge level of the material. We felt it necessary to ascertain whether program components were too difficult or too easy for the target population. We attempted to address this issue through item #16 of the questionnaire. The data in Table 1 indicate that with but two exceptions (Building Envelope and Materials) none of the program components were too difficult to be understood. Even with these two components, there seems to be very little concern. The verbal comments presented in Table 2 also suggest that there were no major difficulties with the knowledge level of the material.

In Objective #4 we were concerned with the sequence of the material. We were specifically interested in finding out whether the pilot participants would see the relatedness of the various

program components. Two of the questions posed in the Discussion Guide Sheet were aimed directly at this issue. Those questions were:

"Does the material seem logically sequenced?" and,

"Do the various program components compliment each other?"

Throughout the discussions during the pilot testing it became quite evident that the materials were logically sequenced and complimentary. However, until the pilot participants were informed of the specific objectives of the program they had difficulty discerning the significance of some of the components. This was particularly true of the "Human Comfort" and "Climate" components.

The issue raised in Objective #6 was whether any adaptations in the materials were necessary in order for both builders and financiers to benefit from them. Throughout the pilot testing, the staff discussed this issue with both the builders and financiers. The overwhelming response from the financiers was that while the materials certainly focused more on building issues they were none-the-less beneficial for financiers. The financiers indicated that having an understanding of these issues would help them as they evaluated a loan application on a home implementing these features, as well as on future homes that perhaps should employ the concepts but don't. The information in response to item #9 (Table 1) also provides some support for this contention. On that item both the builders and financiers were in agreement that the material, as presented, was relevant to their personal needs as a builder or financier. It is also interesting to note that the verbal comments provided in Table 2 there are no

negative statements referring to this issue.

While not built directly into the design of the pilot study, a very critical issue in the pilot was whether there was a need for a facilitator. From the early stages of the project, the program development efforts were focused primarily on the preparation of a program that was instructor free. During one of the site visits by the external evaluator some concern was raised about this issue. A strong plea was made by the external evaluator for the program to have, as an integral part, a facilitator. This contention was supported during the pilot testing. Reaction to one of the questions on the discussion guide sheet provided the forum for this input. This question was, "How do you feel about going through the material without an active facilitator?" Without some form of human intervention, the pilot population seemed slightly confused about their task and the function of the program. Unanimously, they suggested that there be some sort of human intervention or facilitative efforts made by a member of the project staff. When such assistance was provided the activities appeared to run much more smoothly.

The final Objective (#7) for the pilot testing was to ascertain if the builders and financiers had any inclinations toward implementing the ideas in home building and marketing as presented in the program. Items 11 and 12 of the questionnaire dealt with this issue. The data in Table 2 indicate that indeed the pilot population could see some merit in building and/or financing energy consciously designed homes. All of the components except two (Sun and Building

Shape and Ventilation) yielded very favorable responses. The pilot participants indicated that the biggest problem with these two components was two fold. First, the zoning laws might prohibit reorientation of the homes to achieve maximum utilization of the sun and natural ventilation. Second, builders and financiers did not feel that perspective buyers would buy a home that was not oriented the traditional way.

The verbal comments on Table 2 suggest that the builders and financiers would be inclined to build homes employing these concepts. The last two questions on the Discussion Guide Sheet evoked many of these positive responses.

Feedback from the pilot study participants was as expected. They made a number of helpful suggestions. The suggestions ranged from changing the wording or some visuals on certain components, to the total elimination of one program component. At the suggestion of the pilot participants we decided to eliminate the component titled "The Energy Problem".

Once the necessary changes were made in the program components, the instructional delivery system was structured. This involved an ordering of the program components and their respective activities. The project staff had originally structured a four-part program each one day long. However, based on feedback regarding program components and the availability of target population participants, a three-part program was planned.

Having structured the delivery system, we then proceeded with the drafting of participants guide booklets and a facilitator's manual to be used during the training program. Activities for each day were outlined in the Participant's Guide. These guides (See Report #6) reviewed the rationale and goals for the three-part workshop. Then each day's program was overviewed as to objectives, time schedules, and activities for the day. Activities were then described in terms of what participants were to do, what materials were needed, the time schedule, and the group size. A list of questions to be considered was also included.

APPENDIX E

INSTURCTIONAL PROGRAM IMPLEMENTATION

Program Implementation

At the same time final changes were being made in the instructional delivery system, project staff were securing participants for the training sessions, and selecting the training sites. Invitations to participants in the workshops were sent to builders and representatives of financial institutions throughout Houston, San Antonio, and Austin. The project staff corresponded with the Home Builder's Association and Mortgage Banker's Associations in each city. We had originally anticipated 120 participants with the following breakdown: 30 from San Antonio (15 builders and 15 financiers), 30 from Austin (15 builders and 15 financiers), and 60 from Houston (30 builders and 30 financiers). However, we received 45 requests from Houston, 20 from Austin, and 20 from San Antonio.¹ Several would-be participants indicated that it was very difficult to "give-up" three days of work for the sessions. When the training sessions began our population was as follows: Houston 19, Austin 12, and San Antonio 13. Many of those who indicated an interest informed us of unexpected scheduling conflicts; others simply forgot about the sessions, primarily because of two (2) to four (4) weeks gaps between sessions.² It should be noted, however,

¹ Because of this low response, the project staff is organizing a second series of workshops in Houston, Austin, and San Antonio. See page ____ for details.

² This problem has been resolved by reducing the time lapse between sessions. See page ____ for details.

that of those who began the training sessions very few dropped out.

The program was implemented in three parts in each of the three cities: Houston, San Antonio, and Austin according to the following schedule:

Houston

January 10, 1977	Part One
February 7	Part Two
February 21	Part Three

San Antonio

January 14, 1977	Part One
February 10	Part Two
February 24	Part Three

Austin

January 13, 1977	Part One
February 11	Part Two
February 25	Part Three

A summary breakdown of each part is as follows:

Part One

- a. Pre-test of Participants
- b. "Program Overview"
- c. "Human Comfort"
- d. "Role of Climate"
- e. "Energy and Site"

Part Two

- a. Review of Part One
- b. "Building Envelope and Thermal Phenomena"
- c. "Sun and Building Shape"
- d. "Fenestration" (windows and doors)
- e. "Natural Ventilation"
- f. "Daylighting"
- g. "Building Materials"

Part Three

- a. Review of Parts One and Two
- b. "Design Integration"
- c. Computer Based Economic Analysis of Energy Conserving Homes
- d. "Marketing Techniques for Energy Conserving Homes"
- e. Program Component Evaluation
- f. Post-test of Participants

During the planning stage of the project staff anticipated that we would need two facilitation teams to present the workshop. However, the smaller enrollment resulted in our using one three-person team. The team consisted of the three principal investigators.

After the first part of the three-part program we determined that we needed only a representative from the education staff and the architecture staff to successfully run the program.

As the program was being implemented with the three target groups, we determined a number of small changes that needed to be made either in the program or in its mode of presentation. These changes, when made, resulted in a much smoother operation of the training session. The changes primarily concerned the reallocation of time to various components, expanding the directions to some of the activities, and making additions to some of the

program materials to facilitate a better understanding.

While the project staff was disappointed in the amount of participation in the three-part training program held during January and February 1977, our disappointments are being overcome. A heightened interest in our program is beginning to surface in all three cities. We believe that this renewed interest is perhaps prompted in part due to three reasons: (1) Those who participated originally telling others about the usefulness of the program; (2) the program being endorsed by the local Home Builders Associations and (3) A more convenient scheduling.

There were a total of 40 requests from the Houston area for participation in the second series of training workshops. We did re-run sessions on five evenings: April 18, 21, 25, 28, and May 2. A total of 28 participants began and completed the entire training program.

The five-day format called for very intensive training for three (3) hours every evening. Less time was spent between sessions and one of the sessions was eliminated. ("Program Overview"). That session was done verbally. Otherwise, the training sessions were the same as those held during the three-part all-day sessions. Both formative and summative evaluation data are being collected and will be included in the experimental data.

The re-run session in Austin were held May 17 through May 31. Thirty-nine participants registered. Twenty-four completed the entire program. The second series of workshops will be held in San Antonio from June 14 through June 29. We anticipate participation of at least twenty home builders. A second re-run session will also be held from June 13 through June 30 in Houston in which twenty home builders are expected to participate.

We would like to point out that the request for participation in the

program has been disappointingly low from financial institutions. Thus far among 157 participant requests for participation only 22 were received from financial institutions.

The same format as used in the Houston evening sessions was used in Austin and San Antonio. During the evening sessions we are using facilitators that were not involved with the development of the program components nor with the Facilitator's Manual. We feel that if the program is to have any wide distribution it must be able to be used "independent" of the project staff. The feedback we obtain from the "outside facilitators" will enable us to made changes in the Manual so that it can be used easily by any one from a building or other organization offering this program to its membership.

3. Evaluating the Program's Effectiveness

In order to evaluate the program's effectiveness, both formative and summative evaluation procedures were used with the target population. These two modes of evaluation are presented below.

"Formative Evaluation"

The major focal point for formative evaluation during the project was obtaining information relative to the way the training program participants received the program components. A questionnaire was constructed and utilized to obtain this formative feedback from the participants. (See Appendix A) for a copy of the questionnaire and the results obtained from the participants).

The questionnaire was structured to obtain four basic kinds of information. The program participants were first asked to rate each of the program components on a scale of 1 to 6 with 1 being of little value and 6 being extremely valuable. The responses to Item #1 indicate that a large percentage of the participants rated the program components either 5 or 6 with only a few responses falling below 5 (See Appendix A, Item #1). The data gathered in response to Item #1 serve to illustrate the high value the participants

placed on the program components.

In Item #2, the participants were asked to rank order each of the program components. The data presented in Appendix A, Item #2 represent the mode ranking for each component. The data suggests that two components, "Human Comfort" and "Building Materials and Construction" were consistently ranked #1, thus very beneficial. "Daylighting" and "Marketing Techniques for Energy Conserving Homes" were ranked as much less beneficial. The rankings are consistent with the project staff's expectations.

Item #3 was an adjective checklist for the program components, their respective take-home materials, the accompanying activities. There was an overwhelming degree of agreement across all participants descriptors they checked for each component, the take-home materials, and the activities (See Appendix A, Item #3). The data indicates that the adjectives used to describe all elements of the program were favorable as opposed to unfavorable. The participants viewed the materials as interesting, relevant, and well organized. Some of the materials were viewed as repetitious. The project staff had anticipated such observations relating to some of the components. Part of the program were repetitious by design, as a result of applying some basic principles of learning in the curriculum development task. As expected, some of the materials were viewed as unnecessary. This was especially the case with some of the activities. However, the number of participants rating those same materials as relevant tend to overcome and apprehensions the negative rating would generate.

The final portion of the questionnaire requested that the participants identify any specific strengths or weaknesses of the program components and suggest ways of improving the component where possible. Overall, the comments were very supportive. Many strengths were identified. Some weaknesses were discussed. The most commonly occurring weakness specified

was too difficult or not enough time or material presented. The suggestions for improving the components focus mostly on the idea of extending the program in include additional information pieces and more direct presentation of material.

The formative informative generated through the questionnaire provided some valuable insights into the training program ability. Some of the information has resulted in some slight modifications of the training program for use in the re-runs of the training program.

PROGRAM COMPONENT EVALUATION
BY PARTICIPANTS

1. Rate each of the components on a scale of 1 to 6, with 1 being of little value and 6 being extremely valuable in helping you understand ideas related to energy conservation in single family homes. Please place a check (✓) in the appropriate box.

	of little value			extremely valuable			No Re- sponse
	1	2	3	4	5	6	
Human Comfort	0	0	3	9	6	30	
Role of Climate	0	0	0	7	19	22	
Site and Energy	0	0	0	8	10	31	
Building Envelope and Thermal Phenomena	0	0	0	7	13	28	
Sun and Building Shape	0	0	1	8	12	26	1
Fenestration (windows and doors)	0	0	6	5	17	19	1
Natural Ventilation	1	0	3	6	18	20	
Daylighting	0	2	2	12	19	11	2
Building Materials and Construction	0	0	1	6	15	24	2
Design Integration	0	0	1	2	16	27	2
Marketing Techniques for Energy Conserving Homes	0	2	8	10	10	17	1

2. Rank order the training components from 1 to 11 where 1 is the most beneficial component and 11 is the least beneficial component.

<u>Mean</u>	<u>Mode</u>	
4.95	<u>1</u>	Human Comfort
5.21	<u>2</u>	Role of Climate
4.79	<u>3</u>	Site and Energy
4.28	<u>2</u>	Building Envelope and Thermal Phenomena
4.88	<u>3</u>	Sun and Building Shape
6.42	<u>6</u>	Fenestration
6.40	<u>5</u>	Natural Ventilation
8.63	<u>10</u>	Daylighting
4.67	<u>1-2</u>	Building Materials and Construction
6.28	<u>9</u>	Design Integration
9.28	<u>11</u>	Marketing Techniques for Energy Conserving Homes

3. Please check (✓) the appropriate descriptor(s) for each component. Use as many descriptors as you wish for any component.

	Interest- ing	Boring	Rele- vant	Unnec- essary	Repeti- tious	Incom- plete	Well Organized	Difficult
Human Comfort	32	3	28		5		14	
Role of Climate	35		26	1		1	17	3
Site and Energy	35		26	2			20	1
Building Envelope and Thermal Pheno- mena	38		26			1	17	2
Fenestration	28	1	28		1	2	11	
Natural Ventila- tion	35		34	1	3 ✓	1	14	
Daylighting	24	2	30			1	9	1
Building Materials and Construction	37		25			10	14	
Design Integration	33	1	29		2	5	15	2
Marketing Techni- ques for Energy Conserving Homes	21	6	23	4	4	6	11	1
Participants Take Home Materials								
HEC 1	32	1	25		2	2	20	1
HEC 2	30	1	25	1	1	2	21	
HEC 3	31	1	25		1	2	21	
HEC 4	30	2	23	1	1	2	19	

3 (Continued)

	Interest- ing	Boring	Rele- vant	Unnec- essary	Repeti- tious	Incom- plete	Well Organized	Difficult
Group Activities								
Role of Climate Problems	28	2	22	5	2	2	11	1
Site Lay-out-- Individual	34	1	20	5	1	3	10	2
Site Planning-- Group	36		22	4		1	15	2
U-Factor Problems	26	6	23	3	1	2	10	3
Window Placement Activities	25		31	2	1		15	
Site Planning for Natural Ventilation	31		23	4	2		11	1
Materials Selec- tion Problem	24	4	21	3		2	11	1
Design Integration Problem	33		24	1	1	1	14	

E-11

Below we have listed each component of the workshop. We would appreciate your describing any particular strengths, or, weaknesses each might have and any suggesting changes for improvement.

Human Comfort: This film explains the influences of temperature, relative humidity, air movement and sun on human comfort and their design implications.

Strengths: Shows problems forgotten in home design; awareness value high; clearly explain conditions that we are trying to control in relation to our body; creates awareness-can be utilized in commercial as well as industrial thinking

Weaknesses: Somewhat confusing-possibly overly simplified; too detailed; should be discussed longer; too much to absorb too quickly; some repetition

Suggestions for improvement: A bit difficult to understand at first; need more lecture up front; more participation opportunities necessary; emphasize the relevance of humidity; all film material was good to excellent-but needed to be condensed and no repetition of points to be made was necessary; more time remove some intro and trails; speed up pace

Role of Climate: This presentation explains the influence of climate on the design of homes and the importance of climatic information at the building site

Strengths: Repetitious of Human Comfort; good information to use later

Weaknesses: Did not stress that it was a mean rather than a mode; not necessary to dwell on our climate too much-most are aware of its influence compared to other climates

Suggestions for improvement: A bit difficult to understand at first; need some lecture up front; more time; reduce time spent on this subject

Energy and Site: This presentation explains the role a building site plays in energy conservation

Strengths: Shows concepts overlooked in subdivisions today; well done

Weaknesses: Difficult to do much about; often the development stage; hard for developer to comply; devote more time

Suggestions for improvement: Need more organized lecture; more emphasis on adapting to existing site conditions rather than adoptions site conditions that are optimum; futher explain how to layout a house from standpoint of marketing; could show traditional regional architectural solutions to problems (New Mexico adobe, Louisiana Bayou houses on piers, etc.)

Building Envelope and Thermal Phenomena

This session is designed to develop an understanding of how the building surface behaves with respect to heat

Strengths: Shows that wall "thickness" is important; good thrudus; this is the nuts and bolts of evaluating the strengths and/or weaknesses of various materials

Weaknesses: Difficult; somewhat technical

Suggestions for improvement: Consider things in this section more closely to Material Selection; more tie in with Building Materials emphasizing the best energy savers; am not convinced that this concept is final-form presentation, I feel that we create an artificial climate within home

Sun and Building Shape:

This film points out the most desirable shapes which can be energy conserving in a hot and humid climate

Sun and Building Shape: (Con't)

Strenghts: Relevant to our area; very clear; points out the differences of summer and winter; will assist in future evaluation of sites-would devote more time to it

Weaknesses:

Suggestions for improvement: Consider shape of houses other than rectangular and houses with second floor cathedral ceiling; more pictures of actual houses that adhere to this rather than just cube shaped rectangles

Fenestration:

This session will deal with loss or gain of heat in homes through doors and windows. Some preventive techniques and their economics

Strengths: Relevant to both our summer and winter conditions; good points; more about different types (storm windows, double glass, etc.)

Weaknesses: Not enough emphasis put on this; didn't talk enough about amount of gain when using fewer or better doors/windows; too much emphasis on currently "non-marketable" types of windows

Suggestions for improvement: Need more emphasis on practical application; relate the figures on window orientation to cost payback per year; spend more time on ways to work with readily available and accepted products

Natural Ventilation:

This session on natural ventilation will deal with the air-flow characteristics in and around buildings and how to ventilate homes naturally

Natural Ventilation: (Con't)

Strengths: Explains phenomena of air movement; interesting

Weaknesses: Too much time spent on this

Suggestions for improvement: Too much time spent on this. More detailed discussion of more windows for ventilation vs. less for A/C; information as it relates to the products we sell; capsule

Daylighting: This presentation explains the importance of homes using daylight in conserving energy in homes and how to design for daylighting

Strengths: More adaptable to other climate; good

Weaknesses: Not as relevant to our area; hard to tie in with whole system; wasn't as clear as other areas

Suggestions for improvement: Discussion of exactly how to choose more glass/more light or less glass/less light; more clearly tie Daylighting to Energy Savings; how much does it cost to run one 75 watt bulb/per year?

Building Materials and Construction:

This session discusses a set of guidelines for selecting materials for roof, walls and floor and the cost effectiveness of material selection

Strengths: Relevant to home Design and Material selection; excellent; need more of this; R-factors given

Building Materials and Construction: (Con't)

Weaknesses: Need to expand; on rating materials exercise, rated on total cost effectiveness rather than energy savings effectiveness; left out some new products; not complete with respect to styrofoam sheathing; more emphasis needed on the practical side, naming materials with specifying mgs.

Suggestions for improvement:

Need to spend more time on this; need more as to what best to use in this area

Design Integration: This session will show how the various pieces of information from all the previous sessions fit together in the design of a home

Strengths: Very good, brings it all together; good brought all areas together in an easy to understand manner

Weaknesses: Not enough time; not complete with respect to different styles and types

Suggestions for improvement: TV presentation was best single item of the session; should suggest the extensive use of site map with factors to be considered written in

Marketing Techniques for Energy Conserving Homes:

Strengths: Shows that energy conservation can be sold in the home; excellent; subject is most important because purchaser cannot detect various aspects of a home built to conserve energy; more time should be spent with Norman Kangun explaining his ideas in marketing

Weaknesses: Needs to show more on lost vs. savings; too general; need more actual point of sale information to stress what prospect cannot see; too generalized

Suggestions for improvement: Too short; need more ties of features with benefits; should be completely separate presentation because of its importance, need specific examples and written examples to take home

Any additional comments or suggestions concerning the workshop:

Entire program needs to be shortened; repetitious; bulk of program concerned site planning which is not of concern to builders; solutions to site planning not economically feasible; more time should be allocated to definite materials used and possible construction techniques; more organized lecture that would promote questions; seminar well presented and affords greater appreciation of energy problem; talk about the order in which one might undertake various aspects of energy conservation if he cannot apply all facets at once; talk about how to research or at least check on the effectiveness of one's efforts; show some breakdown of the additional cost in an energy conserving home; workshops should be held in evening sessions for more participation; too many booklets-make thicker and fewer pamphlets so there would not have been so much shuffling back and forth; all parts of program valuable but presented on college sophomore level; all three sessions could be presented in faster-condensed method in one 8 hour session; we would not be here if not concerned with importance-but due to diversification of backgrounds, it would be more meaningful if more time could be allocated to each segment of give a more general overlay and omit the technical detail aspects; some method to gain greater exposure should be developed could have been a bit more technical.

APPENDIX F

FORMATIVE EVALUATION

An Overview of the Internal Evaluation Model

The evaluation model developed for this project is a compilation of two exiting evaluation models--a discrepancy evaluation developed by Malcom Provus and CIPP developed by Daniel Stuffelteam. The specific model being discussed herein follows very closely that developed by Edward J. Ambry as discussed in the following article: Ambry, E.J., Evaluation for environmental education. In Taylor, P.A. and Cowley, D.M., Readings in curriculum evaluation. Wm. C. Brown and Company, Dubuque, Iowa, 1972, pp. 135-173.

There are four major phases of the program evaluation hereafter identified by the higher case letter of the alphabet--ascribed to each phase below:

- A. Planning - concerned primarily with the conceptualization and design of the total project.
- B. Operations - those measures taken to provide an environment such that the conceptual model proposed can be implemented with the least amount of trouble.
- C. Development - deals with the actual production of artifacts called for in the goals of the project.
- D. Implementation - program components are actually put into operation.

Each of these phases has assigned to it one or more standards demanded of the project during the project funding period. These standards are identified by arabic numerals. The above elements of the model are represented on the vertical dimension of the evaluation schematic. On the horizontal dimension of each element identified above is a further breakdown of the model into four components.

C - Context - This dimension represents a very specific need associated with any standard of any phase. They (the context needs) are related almost entirely to that standard, but not necessarily exclusive of other standards.

I - Inputs - What are those project inputs necessary for meeting the needs of that specific standard - the needs are those specified in the context stage.

P - Processes - How program inputs, functions, or processes occur in satisfying the context needs for that specific standard.

P - Products - What are the specific outcomes achieved in working toward satisfaction of a given standard.

The CIPP (horizontal) dimension of the evaluation model represents the very specific evaluation questions asked to generate the data used in the discrepancy decision-making processes of the total model.

Procedures for Employing the Evaluation Model

As one attempts to use the model to collect data relevant to project it should become evident that although the evaluation model has the appearance of being linear, indeed it is not. One cannot simply go through each stage of the model treating that stage independently of the other stages. The evaluator, in applying the evaluation model, must analyze several standards of parent stages simultaneously. In addition, many of the standard and/or stages must be evaluated many times throughout the duration of the project.

Given the above statements as basic premises upon which the evaluation model has been devised, a discussion of the processes for utilizing the model seems in order. As was indicated in the opening discussion of the evaluation model, there are four stages inherent in the model: Planning

Organization, Development, and Implementation. These were identified with higher case arabic letters in the model proper. Associated with each stage are four evaluation process components for assessing the functioning of each stage of the model. The process components are: (1) standards, (2) performance, (3) comparison, and (4) discrepancy information.

The standards component of the evaluation process refers to those global statements indicating criteria of acceptance of various program entities. The standards are written in the form of qualitative statements specifying some set of ideals for various program elements. There might be as many as ten standards stated for any one stage of the project.

Since standards are such broad statements, the successful evaluation of each standard must be achieved indirectly rather than directly. That is, while one is given a standard statement, there are a number of "sub-statements" which would provide a more reliable indicator for judging whether, in fact, a given standard had been achieved. In this model, the sub-statements" appear in the form of specific questions to be asked relative to a given standard. The "sub-statements" come under the heading of: C - Context, I - Input, P - Process, and P - Product. (See above for a more detailed explanation of CIPP). It is the evaluator's responsibility to seek answers to these questions to attest to the degree to which the project is functioning successfully. To score a given statement, the evaluator either checks the appropriate response, provides a narrative discussion relative to a given issue, or responds utilizing a scaling response where requested. The scale is: (1) Very Adequate, (2) Adequate, (3) Partially Adequate, and (4) Inadequate.

In seeking answers to the questions raised as "sub-standards," the

evaluator moves into the second of the processes inherent in the evaluation model - Performance. The answers to the questions grow out of, and are reflective of, the actual performance of the project. The project performance is assessed within the parameters of the evaluation model. The assessment of the project performance is primary objective of the evaluation model.

The third process identified in the evaluation model is Comparison. This process involves a careful analysis of all data obtained through the application of the evaluation issues. The process requires a tabulation of the responses to the evaluation questions. The comparison results when the project performance data is compared with the desired performance as specified in the standard statement or "sub-standard" question.

Once all the data are in and the analyses conducted in the comparison process stage have been completed, the final process is the Discrepancy Information process. This process is analogous to the discussion and conclusion stages of a research report. The discrepancy information process requires the evaluator, working with project staff to review all of the data relative to each standard of each stage and make a decision as to whether a given standard or stage has been adequately completed. If the standard or stage is judged to have been completed, then attention is focused on the next standard or stage. If the standard or stage is judged inadequate, then formative information is fed back into those project activities relevant to the standard or stage under consideration in order to enhance its chances of being judged adequate in future evaluation activities. The evaluation model is presented on the following page.

Responsibilities of Internal and External Evaluator*

The evaluation model being developed for the project was used by both

the project personnel involved with the internal evaluation, and the internal evaluator. The major responsibility of the internal evaluation staff was to develop the evaluation model and collect relevant project data utilizing the model. In addition, the internal evaluation staff worked closely with the external evaluator in the refinement of the evaluation model and in providing requested data to the external evaluator. Finally, the internal evaluation staff submitted quarterly reports to the project director for inclusion in project quarterly reports, and also submitted such reports to the external evaluator so that a meta-evaluation of the project can be conducted.

The external evaluator is a sub-contracted expert in evaluation. The external evaluator identified for this project was Professor James K. Duncan of the Curriculum and Foundations Department of the Ohio State University. The external evaluator worked very closely with project staff in the development and refinement of the evaluation model. In addition, the external evaluator conducted his evaluation by employing the evaluation model developed for the project. In a real sense, the external evaluator conducted a meta-evaluation of the project. The specific responsibilities of the external evaluator included:

1. Continue to provide guidance in the development and modification of the evaluation model and data collection instruments and procedures.
2. Provide external monitor over data collection to insure consistency with the evaluation model and with the goals specified at the onset of the project.
3. Each month review data generated by the evaluation model and provide preliminary formative evaluation reports.
4. Provide written feedback on each of the above for the project staff to be used in a formative sense.
5. Provide quarterly reports as requested by project staff.

Report of the Final Quarter of Project Operation

To date, our project has addressed every objective included in the initial project proposal. We have carried out every aspect of the curriculum model designed for the project. We have fulfilled every stage and inherent standard of the evaluation model.

During the last quarter the project undertook a major step in the dissemination of project products on a national scale. To do this we conducted a National Symposium on Energy Conservation Education in Washington, D.C. While attendance was not what we had hoped for, we were still pleased with the outcome of the conference. Participants in the conference represented several states. They represented institutions of higher education, the Department of Energy, the Department of Health, Education and Welfare, savings and loan associations, and the National Home Builders Association. Such a broad representation must be viewed as a success.

While the conference was a success, the dissemination issue is still a concern to the project staff. Funds were not available for any part of dissemination efforts beyond the initial workshops and the National Symposium. Much work still needs to be done in this area.

Data are now in which address the degree to which we were successful at meeting the performance objectives with participants as specified in the objectives section of the original proposal. (These data are reported in the summative evaluation section, Appendix G).

Formative Evaluation in Retrospect

An examination of the information obtained by implementing the formative evaluation model through the project reveals some interesting insight into an interdisciplinary curriculum development effort such as this

one. Some of these insights are presented below.

- (1) If an interdisciplinary curriculum development project is to function effectively it must have a well established communication channel

A necessary prerequisite for effective communication is a common vocabulary. When staff members use various terms other staff personnel must assign to those terms the same, or at least very similar referents. An example from our project series illustrates this point. When we were attempting to prepare the objectives for the various components of the training programs we had a great deal of difficulty. The education staff clearly understood what we meant by objectives. They knew the form we expected objectives to be written in. However, the architecture staff did not have the same referents. Therefore, we had to spend some time in group discussions attempting to deal with such terms. These group discussions were also used in part to teach all project staff the technical language of architecture that was to be included in the training program.

Had our project staff not been willing to take time to get a better understanding of the language differences, the project would have been in trouble from the onset. A willingness to take time to explore language differences is an indicator of a degree of open-mindedness essential for effective project operation.

- (2) If an interdisciplinary curriculum development project is to be effective it must have a clear organizational structure

At the onset our project was seemingly lacking in terms of an organizational model. There were some decisions that needed to be made with group input, but the vehicle for achieving such input had not been established, thus causing some problems. There were also times in which the project director needed to make leadership moves but felt somewhat inhibited in

in doing so for fear that other project staff might feel he had overstepped his area. When the project staff did get together and address the organizational issues, project operations seemed to run much more smoothly.

(3) Wise utilization of staff is essential in interdisciplinary curriculum development project

When our staff was established some attention was given to an equal distribution of personnel. Such a move we found later was not wise. Had we had the foresight to see the kinds of staff needs which would arise throughout the project we would have utilized our staff much more wisely. At the first of the project we needed a heavy loading of project staff in architecture. At that point in the project extensive library research was needed to ascertain the content elements to be included in the training program components. Later in the project we needed a heavy loading in the education staff. Once the content elements had been identified, these had to be transferred into understandable, and useable instructional components. Education staff was needed to write these components. Finally, once the components were written, artifacts had to be produced to illustrate the concepts and ideas presented in each component.

Had we been able to anticipate such staff loading we would have hired part-time staff to do specific tasks rather than carry some staff who were of little benefit to the project during lag time.

(4) Institutional support for project staff is essential

It is indeed difficult for project staff to become actively involved in a funded project that is not necessarily supported by the institution for which he is working. In our case it appeared that the University wanted the funds but was not willing to recognize the project activities

and products as being meritorious when it came to pay increases and/or promotion/tenure benefits. It appeared to us that working on the project was, in fact, not a worthy endeavor; that we could have spent our time more wisely designing local buildings, or publishing journal articles rather than being involved in such a long-range, time consuming job. Such a reality was hard for our project staff to reconcile, and at times affected our productivity

FORMATIVE EVALUATION

A. 1. Philosophy

The philosophy of the program should reflect the recognized needs and the educational philosophy of three academic disciplines involved.

C	I	P	P
(a) Were the previously established needs considered in determining the program's general philosophy?	(a) Does the project's philosophy reflect the established need?	(a) List the needs which are reflected in the philosophy.	(a) State the project's general philosophy.
Yes	Fully	<i>There are basic knowledge needs, economic needs, and personal needs dealt with in the philosophical position taken by project staff.</i>	<i>While the philosophy is not stated directly, it is evident in a number of activities of the project. The project proposal posits most of the philosophical position taken by project staff. We feel that a direct philosophical statement relative to the project would be inappropriate.</i>
No	Partially		
No needs established	Not at all		

**Indicates additions made in project report #5*

***Indicates additions made in project report #7*

All other comments and/or responses to items occurred in the project reports prior to #5.

A.2. Identification of Needs

F-11

In order to facilitate the planning for project's involving behavioral changes in people as well as increasing their knowledge and skills, the needs of the people to be served should be identified.

C				
a. (1) Were the needs of these groups considered? (Check those that apply)				
	Y	N	N/A	
Home Builders	x			
Developers	x			
Realtors				
Financiers	x			
Home Buyers	x			
Other (Specify)				

It might be noted here that in a number of instances the roles of home builders and developers were played by the same person.

I				
a. (1) Were the needs of these groups actually applied in planning?				
	Y	N	N/A	
Home Builders	x			
Developers	x			
Realtors				
Financiers	x			
Home Buyers	x			
Other (Specify)				

P	
a. (1) How did you attempt to ascertain these needs? (Explain)	
	Through a marketing survey conducted by Higginbotham & Associates in coordination with Dr. Kangun of our staff. (See Appendix for instruments and data from those surveys). In addition, the architectural staff conducted a thorough review of the literature in passive systems for architectural design in residential dwellings. Together, these processes yielded a composite of knowledge needs, marketing considerations and personal concerns as related to the project goals.

P	
a. (1) What modifications were made to the original proposal in order to fulfill these needs? Explain.	
	While we do not anticipate any significant changes in the original proposal, the data relative to the availability of builders for workshops does offer some potentially strong constraints on our proposed curriculum.

C

- a. (2) What were the needs? Specify.

The data and information resulting from the marketing survey and from the literature search has led to a number of needs. Those can be grouped into knowledge needs, marketing needs, and personal needs.

(See page 7, for indicators of knowledge needs.) The marketing needs can be gleaned from the marketing survey, as well as the personal needs. The personal needs are primarily focused on builders' availability for workshops.

- b. (1) Were the following types of needs considered?

	Y	N	N/A
Knowledge x			
Attitudinal x			
Performance x			
Economic x			
Social x			
Personal x			

I

P

- a. (2) What criteria did you use for selecting specific needs? Explain.

P

- a. (2) What new needs did you identify?

The personal needs of builders relative to time constraints for workshop attendance.

- b. (1) Were the following types of needs actually applied in the planning?

	Y	N	N/A
Knowledge x			
Attitudinal x			
Performance x			
Economic x			
Social x			
Personal x			

A.3. Resource Identification

To determine the limitations, capabilities, and potential of the program, all currently available and anticipated resources should be identified and classified.

C			
a. (1) Was the importance of resource identification considered in planning the project? (Check all that apply)			
Personnel:	Y	N	N/A
General staff	x		
Specialists	x		
Consultants	x		
Other			
Site:			
Natural	x		
Buildings	x		
Other*			
Information:			
Library	x		
Professionals			
Builders	x		
Realtors	x		
Developers	x		
Financiers	x		
Architects	x		
Marketing			
Personnel	x		
Educators	x		

*For program implementation in Houston, Austin, San Antonio

I
a. (1) Were the available resources identified according to some criteria relative to the project?

Yes
No

P
a. (1) How did project planning utilize and anticipate resources?
(Discuss briefly)

In terms of the proposal, the project resource needs were specified and actions were taken to identify what of those resources were available to us. Using this process, we were better able to predict needed resources in the original proposal.

a. (2) What limitations were set on project planning by a lack of resources?

Limited library resources, limited space to house the project and project personnel. Limited equipment (desks, filing cabinets, etc.) for staff. It was difficult to find builders, developers, and financiers who were significantly interested in the project.

P
a. (1) How did the final project plan reflect on understanding of program limitations in the light of available and anticipated resources, capabilities, and potential?
(Discuss)

We realized that the project staff would have to be increased on a short-term contract basis to facilitate the development of program materials. It was necessary to be selective in the location of site(s) for the implementation stage of our project. There is concern over the availability and willingness of

A.3. Resources Identification Cont'd

C

I

P

P

a. (1) Continued

builders and financiers to participate in the program. We realized the problems that might exist relative to the time lag of production of materials by the media production agency.

A.4. Design Production

The appropriate project design (curriculum model) can be developed best by blending all of the previously gathered information and material into a workable plan for meeting the general philosophy of the project.

- a. Who was involved in the development of the curriculum model for the project:

Educational staff x
Marketing staff x
Architecture staff x

Describe the kinds of inputs into the curriculum design model made by each program component.

- a. Describe the process by which different project components made inputs into the project model.

The design model was originally developed by the education staff reflecting upon total goals and objectives for the project. Following the original generation of the model the total project staff met to discuss any necessary kinds of changes the model needed. Given that input, the model was changed into the form it now exhibits.

Present and describe in detail the project curriculum model.

See Section III, p. 5 of Project Performance Report No. 1.

- C
- b. Was the design developed in keeping with the general philosophy and needs as previously established?

Yes

No

- I
- b. How functional was design:
Highly Functional
Functional
Partially Functional
Not Functional
(Describe Why)

Thus far, the model has been highly functional in that it has provided direction for the project. However, the model may have to be modified somewhat depending upon the nature of the instructional delivery system finally developed.

There were no significant changes in the curriculum model utilized in the project.

- P
- b. (1) To what extent does the design reflect the general philosophy of the project?

80-100%

50-80%

30-50%

less than 30%

not at all

- P
- b. (1) Was the project design sufficient for achieving the philosophy of the project?

There may have been too much emphasis placed on the need for the marketing survey. Delay in this element resulted in the project falling behind schedule. We later realized that perhaps we did not need to wait on the marketing information. Also, during the pilot test and revision stage of the model, there were unforeseen delays that have caused us some concern. These delays were primarily due to availability of pilot population. The model does not reflect such possibilities.

F-15

A.5. Standard: Financing

The financial feasibility of the project can be determined only after a preliminary budget has been prepared which shows all anticipated expenditures and identifies all potential sources of funds.

C

- a. Was the necessity of having a complete preliminary budget prior to making final dispositions and assignment of priorities realized?

Yes

No

- a. Was a preliminary budget prepared?

Yes

No

Did it show all anticipated sources of funds?

Yes

No

Did it provide a complete overview of anticipated expenditures?

Yes

No

- a. Attach a copy of the preliminary budget? (Give a brief explanation of any unusual items.)

- a. (1) What revisions were required in the preliminary budget as the project became operational? (Attach a copy of the final budget.)

- a. (2) Briefly explain any changes of 20% or more.

A.6. Standard: Priorities

The implementation of an effective proposal and the efficient use of finances requires that priorities be determined and assigned in the planning stages of the project.

C	I	P	P
a. Was consideration given to the establishment of project priorities based on:	a. Were actual priorities established in view of:	a. (1) How were priorities determined?	a. (1) Were these priorities compatable in terms of the actual project?

C

I

P

- a. (2) Who made the final determination on priorities? (Give title or position or identify group.)

This was a staff decision made with input from all staff.

Perhaps more attention should have been given to the educational needs relative to the time and kinds of information needed by education staff as they developed the curriculum pieces.

Also, there should have been much more consideration given to the needs of the architecture staff as they prepared the visuals for the curriculum pieces. Several additional part time staff should have been contracted during the development phases.

P

- a. (2) What changes would you (or did you) make in your listing of priorities as a result of project operation to date?

With a delay in obtaining marketing data, project staff determined that we should go on with development of other components of the project previously planned to follow the marketing survey. In addition, data from the marketing survey indicated that the training session for builders, developers and financiers should be much shorter. However, after much staff discussion, the decision was made to continue with the longer sessions.

ORGANIZATION

F-19

B.1. Standard: Organizational Pattern

An organizational pattern with clear cut lines of responsibility is essential to an effectively operating project.

C	I	P	P
a. (1) Did the original proposal provide for a plan of structural organization for the project? _____ Yes <u> x </u> No	a. (1) Was the organizational plan implemented? _____ Yes _____ No	a. (1) Describe how the organizational plan was implemented. <i>Does not apply.</i>	a. Was the original organizational plan effective? _____ Yes _____ No <i>Does not apply.</i>
a. (2) If no, was an organizational plan developed later? _____ <u> x </u> Yes _____ No Date of project implementation <u>September 1, 1975</u> Date organizational plan was developed <u>January, 1976</u>		a. (2) What criteria were employed in developing the original organizational plan? 1) <i>To facilitate day to day and overall project decisioning process.</i> 2) <i>To clarify individual responsibilities.</i> 3) <i>To indicate reporting channels.</i>	b. Was the modified organizational plan effective _____ <u> x </u> Yes _____ No
b. Was either the original organizational plan or the one developed after the project began modified? _____ <u> x </u> Yes _____ No <i>Slightly</i>	b. (1) What were the forces or conditions that made modifications		

270

271

C

I

P

P

- b. (1) Continued
advisable?

*Staff concern over
inability to make
group decisions.*

- b. (2) Who modified
the organizational
plan?

Project Director _____
Project Co-Director _____
General Staff x
H.E.W. Dept. _____
Other (Specify) _____

- b. What criteria were
employed for modifying
the organizational?

*Whether the staff felt
the model was functional.*

Attach a copy of the
organizational plan
and chart.

See page 4a.

B.2. Standard: Personnel

I. All personnel involved in the project should be assigned clearly defined responsibilities.

- | C | I | P | P |
|--|---|---|---|
| <p>a. Did your project proposal, as funded and/or amended, contained clearly defined areas of responsibility?</p> <p style="text-align: center;"><u> </u> Yes <u> x </u> No</p> <p><i>While general responsibilities for major project staff (i.e., general architecture, marketing and education staff) were specified in the proposal, specific tasks and responsibilities were not.</i></p> <p><i>During the development stage, project staff were assigned or assumed clearly defined roles (e.g., the architecture staff was responsible for providing substantive input to the education staff whose</i></p> | <p>a. (1) If no, when were project responsibilities and personnel coordinated to their proper positions?</p> <p style="text-align: center;"><u> </u> Planning Phase
 <u> x </u> Early Operational Phase
 <u> </u> Late Operational Phase
 <u> </u> Not at all.</p> <p>(2) If yes, was it necessary to modify the areas of responsibility to personnel?</p> | <p>Is there constant assessment of personnel in terms of areas of responsibility?</p> <p style="text-align: center;"><u> x </u> Yes <u> </u> No</p> | <p>a. Are all project responsibilities being met?</p> <p style="text-align: center;"><u> x </u> Yes <u> </u> No</p> <p>b. If no, why not?</p> <p><i>But there have been some communication problems inherent in such an interdisciplinary project. These problems have caused some delay in carrying out some aspects of the project, especially in terms of the development of the curriculum materials.</i></p> |

C

I

P

P

a. Continued

responsibility was to write curriculum components for the project. Following the initial writing, both architecture and education staff did editorial work on the components. Then the architecture staff had to develop materials prior to a component being supplied to the A V Corporation.

II. Project personnel should be chosen and appointed on the basis of their individual capabilities for fulfilling specific staff positions.

- a. Were the personnel chosen on the basis of individual capabilities for specific staff positions?

☒ Yes ☐ No

- a. (1) If yes, on what basis were capabilities assessed?

☐ Testing
☒ Professional Background
☒ Ability
☒ Previous experience
☒ Interest
☐ Recommendation
☐ Other (explain)

- a. (2) If no, explain.

- a. Is there continual assessment of individual capabilities for assigned positions?

☒ Yes ☐ No

- a. Do program personnel capably fulfill assigned positions?

☒ Yes ☐ No

B.3. Standard: Facilities

Sufficient, adequate and appropriate facilities and/or use area for the proper and efficient operation of the program should be provided and maintained in such a manner as to be available and usable at all times while the project is in operation.

F-23

C	I	P	P
a. (1) Were suitable basic facilities and/or use area, to fit the needs of the project, immediately available? <u> </u> Yes <u> x </u> No	a. (1) Was it necessary to renovate and adapt the facilities and/or use area to the project program? <u> x </u> Yes <u> </u> No	a. (1) Was the selection of facilities and/or use area arrived at by cooperative agreement of the project planners? <u> </u> x Yes <u> (x) </u> No	a. (1) Did the basic facilities and/or use area effectively provide for the program's objectives? <u> x </u> Yes <u> </u> No
a. (2) When? <u> </u> During the planning stage. <u> </u> At the beginning of the project's operation? <u> x </u> During the first months of the project's operation <u> </u> Later? (specify)	a. (2) Was the program adapted to meet the facilities and/or use area? <u> </u> Yes <u> x </u> No a. (3) Were new facilities and/or use area provided to meet program needs? <u> x </u> Yes <u> </u> No <i>In that we borrowed such things as desks, filing cabinets, and book shelves.</i>	a. (2) If no, who was responsible for the selection of facilities and/or use area? (Give title or position) a. (3) Were the facilities and/or use area established on a year-round permanent basis? <u> </u> x Yes <u> </u> No	a. (2) If no, did it reflect on original planning? <u> </u> Yes <u> </u> No a. (3) Were any major changes required in the project's facilities and/or use areas? <u> x </u> Yes <u> </u> No
a. (2) <i>During the final four months of project operation we were forced to move our entire operation to a new location.</i>	<i>In that we borrowed such things as desks, filing cabinets, and book shelves.</i> a. (3) <i>The new location, while minimally adequate were in no way conducive to optimal production of project operations.</i>	a. (1) <i>The decision to move was made by the university administration in order to provide facilities for a new project in the College of Education. There was no input from project staff.</i> a. (3) <i>The facilities were temporary, lasting until completion of project activities.</i>	a. (3) <u> x </u> Yes <u> </u> No

C

I

P

P

- b. Was it necessary or advisable to secure facilities and/or use areas outside the university?

☒ Yes ☐ No

**During the development stage we had to utilize resources of the A V Corporation. In addition, we have contracted for outside meeting facilities during the implementation stage. These are located in Houston, Austin, and San Antonio.*

- b. If yes, was the selection of "distant" facilities and/or use areas based on providing better programs at lower per unit cost?

☐ Yes ☒ No

☒ Providing a better program at a higher per unit cost?

☐ A temporary expedient?

**These will come through sub-contracts with an audio-visual production company employed to aid in the production of mediated materials and through hotel facilities picked for implementation sites.*

- a. (4) If no, were the facilities and/or use area rented or leased on temporary basis, to be sued as required?

☐ Yes ☐ No

- a. (5) Were program facilities and/or use areas established for resident, day use, or both types of programs?

☐ resident ☐ day

☒ both

- b. What processes were employed to select the facilities and/or use area outside the boundaries of the university?

Project staff asked different companies to present their portfolios with decision being made based on both quality and proposed cost

- a. (4) If yes, what changes were required and why?

We had to acquire office furniture which would fit the building decor. This required our obtaining furniture from outside the building in which we were housed and painting many pieces of that furniture to match the building color scheme. Again, let us make clear that these modifications were not made to meet the program, but to meet decorating specifications of the building in which the project is housed.

With the entire project being moved we were forced to make modifications in our general office operation. We had to relocate all our materials, resulting in a loss of some of them due to confusion. Our filing system had to be rethought.

per unit artifact.

*In terms of hotels project staff requested cost breakdown from several locations, then selected the least expensive offering the desired quality of service.

b. Were the "distant" facilities and/or use areas adequate for the program of the project?

☒ Yes ☐ No

*The A V Corporation has been so thus far. This will be determined for hotels during the implementation stage.

All facilities and use areas outside the university were found quite adequate.

B.4. Standard: Materials and Equipment

Appropriate materials and equipment for the proper and efficient operation of the project should be provided and maintained in such a manner as to be available in sufficient quantity and usable condition at all times while the project is in operation.

C

- a. Was provision made to have adequate materials and supplies?

☒ Yes ☐ No

I

- a. (1) Did the budget provide for necessary materials and supplies?

☒ Yes ☐ No

- a. (2) Were supplementary funds required to provide materials and equipment?

☐ Yes ☒ No

If yes, explain:

P

- a. (1) Were supplies and/or equipment obtained or purchased through regular university purchase channels?

[Supplies]
☒ Yes ☐ No

[Equipment]
☒ Yes ☐ No

- a. (2) If not, how were they obtained?

P

- a. (1) Was the purchase procedure used a satisfactory one?

[For Supplies]
☒ Yes ☐ No

[For Equipment]
☒ Yes ☐ No

- a. (2) Was acquisition through methods other than purchasing satisfactory?

Explain:

C

I

P

P

F-27

b. Was provision made for maintaining equipment?

☒ Yes ☐ No

b. (1) Were funds available for equipment maintenance?

☒ Yes ☐ No

b. (2) Who was responsible for maintenance of equipment?

University of Houston and/or project finances.

a. (3) What problems were presented if supplies and/or equipment were purchased through school purchase channels? (List)

Time element.

Several times items were needed immediately, but approval and channels of procedure hindered rapid delivery.

a. (4) How were these problems resolved?

Several times items were "walked through" so as to speed processes.

b. What problems were presented in maintaining equipment? (List)

Not applicable, to date.

None

b. Were you satisfied with maintenance procedures and results?

If no, explain why not.

Not applicable, to date.

Not applicable

B.5. Standard: Budget

A. A clearly defined budget should be prepared, utilizing acceptable accounting which takes into consideration all areas of income and expenditure.

C	I	P	P
a. Did the project proposal contain a clearly defined budget?	a. (1) Was the original budget approved and put into operation?	a. (1) Was the budget workable?	a. (1) Did you achieve the project objectives within the original or revised budget?
☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	
	a. (2) If no, how was it modified?	a. (2) Was the revised budget workable?	☒ Yes ☐ No
	☐ % increase	☐ Yes ☐ No	
	☐ % decrease		a. (2) If no, did you modify the program to achieve the project objectives?
	a. (3) Were additional funds, other than federal funds, provided?	a. (3) Was the USOE financing accounting system (G00-75-02108) adopted?	☐ Yes ☐ No
	☒ Yes ☐ No	☒ Yes ☐ No	
	By whom? (Identify)	a. (4) If not, what variables presented themselves which resulted in modifications? (List)	a. (3) If no, were additional funds, facilities, or services obtained from other sources?
	University of Houston cost sharing.		☐ Yes ☐ No
	a. (4) What % of the total budget was provided from non-federal funds?		By whom? (Identify)
	10% This percentage cost sharing by University of Houston		

B. The budget should be managed in accord with all rules and regulations of the university.

C

I

P

P

- a. (1) Are clear budget records kept (district and project)?

[Project]

☒ Yes ☐ No

[District]

☐ Yes ☐ No

- a. (2) Are the project's budget records maintained by a university fiscal officer?

☒ Yes ☐ No*and by the project's senior secretary.*

- a. (3) Are the project's budget records maintained by a special project fiscal officer?

☐ Yes ☒ No*other than the project's senior secretary.*

- a. (1) Are the project's budget records kept accurately and up-to-date.

☒ Yes ☐ No

- a. (2) If no, how did you (or will you) rectify this? Explain.

- a. (1) Was record-keeping achieved without undue friction?

☒ Yes ☐ No

- a. (2) List reasons why the project's budget records were not kept current.

- a. (1) Did control of fund accounts and expenditures reflect sound project budget planning?

☒ Yes ☐ No

- a. (2) If no, what changes were required? (List)

b. Was an audit planned
for the project?

☐ Yes ☐ No

By Office of Research.

b. (1) Were funds pro-
vided for auditing
the project's financial
records?

☐ Yes ☐ No

b. (2) If funds were not
provided, how did you
finance an audit?
(Explain)

b. Was an audit made?

☐ Yes ☐ No

b. (1) Did an audit
indicate a need
for project budget
revision?

☐ Yes ☐ No

b. (2) If yes, list
those revisions.

B.6. Standard: Scheduling

An efficient method of scheduling staff and students for facilities and equipment should be employed in order to obtain maximum effective utilization of these resources.

C

- a. Did the project proposal contain an efficient method for scheduling project personnel for use of available facilities and equipment?

_____ Yes x No

**While not included in the original proposal, a schedule was developed during the second half of the first year which provided for tracking the development of curriculum components implementation with pilot population modifications in the program and/or components following implementation and a tentative data collection process inherent in the evaluation model.*

I

- a. (1) Was the original method for scheduling implemented?

x Yes _____ No

- 2 (2) Was the original method for scheduling modified?

x Yes _____ No

**Some adjustments were necessary as various deadlines were not met.*

P

- a. (1) Is scheduling for use of facilities and equipment completed well in advance?

x Yes _____ No

- a. (2) How far in advance is the scheduling completed?

3-6 weeks x
4 months _____
other _____

- a. (3) Did scheduling involve sharing facilities?

x Yes _____ No

- a. (4) If yes, did serious problems result?

_____ Yes x No

- a. (5) What was the major cause of the scheduling problem?

Time x
Competition from other groups _____
Transportation _____
Other _____

P

- a. (1) By employing the original schedule, was maximum utilization of staff and faculty resources achieved?

x Yes _____ No

- a. (2) By employing a modified schedule was maximum utilization of student, staff and facility resources achieved?

_____ Yes _____ No

- a. (3) Was sharing of facilities satisfactory?

x Yes _____ No

- a. (4) Were these problems satisfactorily resolved?

_____ Yes _____ No

- a. (5) Who resolved scheduling problems?
Project Director _____
Project Staff x

- a. (6) What criteria did you employ to assure the utilization of these resources?
(List or attach data)

F-31

B.7. Standard: Dissemination

- A. Pertinent data and information compiled as a result of the project should be properly catalogued, interpreted in a meaningful manner, and distributed to interested and concerned parties.

*Most of this will be applicable next year. **However, we feel that some dissemination has already begun through some articles in newspapers, the pilot population discussing the issue with colleagues, and through information fliers sent to builders and financiers.*

C	I	P	P
a. (1) Was a system established for cataloging, interpreting and distributing information developed in the project? <u> x </u> Yes <u> </u> No	a. Who implemented the system? (Give title or position) <i>Senior Secretary</i>	a. (1) Was the original system workable? <u> </u> Yes <u> x </u> No <i>We are in the process of critiquing and revising.</i>	a. (1) Did the <u> x </u> original, <u> </u> modified, system enable you to meet the objectives for dissemination of information? <u> </u> Yes <u> </u> No <i>See a. (1) under P on this page.</i>

***All project materials have been refined and filed and are ready for dissemination. The filing system now employed appears adequate.*

a. (2) Was the system:

 In operation at the inception of the project?
 x During the first six months of operation?

* x After six months of operation?
 The final modified system?

b. If a dissemination plan was not established, check here. x

**Applies to the total training program and not to specific elements. This plan will be a part of the third year of funding.*

b. Who decided that dissemination should not be implemented?
 (Give title or position)
Project staff

a. (2) If modification occurred, list factors which caused the system to be modified.

***Inefficiency of first system*

a. (3) Was the modified system workable?

*** x* Yes No

b. What factors prevented implementation?

**Materials had to be developed prior to developing a dissemination strategy.*

a. (2) What are the criteria for judging that dissemination of information was successful? (List or attach data)

Internal project feedback.

b. What have been the effects of not having a dissemination system implemented?

**No problems thus far since one has not been needed yet.*

B. Any materials prepared for dissemination should be aimed at the level of the proposed recipients.

a. In the preparation of materials for dissemination, was the audience level kept in mind?

 x Yes No

If no, go directly to Section C.

a. Who determined the audience level?

Project Director
 Project Staff x
 Other

a. How was the audience level determined?
 (List criteria below)

**Partially from project marketing survey, partially from feedback during the pilot and finally from the project staff's general perception of the target population.*

a. Were the desired interpretations by the audience realized?

 x Yes No
 (List criteria below)

**By the population selected for the pilot. We hope this is a prediction of outcomes with the target population.*

- C. Dissemination of information should not be limited to one or two methods, but should rather include various methods and techniques for reaching the respective audience.

C	I	P	P
a. Was a plan incorporating a variety of methods for dissemination prepared? ☐ Yes ☒ No <i>*Will be determined during post implementation period. However, some various dissemination activities have already begun.</i> <i>**A plan for dissemination has been developed. The implementation of which is the focus of the third year funding.</i> <i>Funds provided for this project were for research and development and did not include dissemination. Therefore, any dissemination done will be limited.</i>	a. List the methods used for dissemination. <i>*Newspaper releases, journal articles, three day training program, and participants in the home building industry who pass the information on to colleagues.</i> <i>**During the third year funding we are planning an international conference on "Energy Conservation Education". This conference is aimed at 100 very select participants involved with the home building industry, or education for world crises situations.</i> <i>This conference was held and well received by those in attendance. However, these efforts still fall short of desirable moves.</i>	a. (1) Were the original methods adequate and workable? ☐ Yes ☐ No a. (2) What factors affected the operation of the original plan? (List) a. (3) Were any changes made? (List) b. (1) Was a revised method of dissemination developed? ☐ Yes ☐ No b. (2) Was the revised method of dissemination workable? ☐ Yes ☐ No <i>*Not applicable at this time.</i>	a. (1) Were the project's objectives for dissemination of materials achieved? ☒ Yes ☐ No (locally) a. (2) What is the basis for this judgment? (Attach supporting data or list criteria) a. (3) What factors prevented success? (List) b. (1) Was the revised plan successful? ☐ Yes ☐ No <i>If no, what factors prevented success? (List)</i> <i>*Not applicable at this time.</i> <i>Attendance at each of the repeat workshops served to indicate the positive reception of program components by participants in the home building industry.</i>

B.8. Standard: Records Maintenance

An efficient system for maintaining any and all records must be devised in order to insure a clear and complete record of all activities and functions, and provide continuity despite possible staff changes.

C	I	P	P
a. (1) Was an efficient system for carrying out the above planned? ☒ Yes ☐ No	a. (1) Were the records up-to-date? ☒ Yes ☐ No	a. (1) Was the system put into practice? ☒ Yes ☐ No	a. (1) Did a complete record of all activities and functions throughout the project afford continuity to the project? ☒ Yes ☐ No
a. (2) If no, was a system planned later? ☐ Yes ☐ No	a. (2) Was the responsibility for keeping records delegated to: Office personnel ☒ Professional personnel ☐ Director ☒ Other ☐ (Explain)	a. (2) If no, list reasons why the system was not implemented.	a. (2) List the major areas in which records were kept. Staff meetings. Letters and memos. All written materials prepared by staff members, budget material and information.
a. (3) If yes, Immediately ☐ Short time ☐ 6 months or more ☐			a. (3) Who has benefitted most from these records? project staff ☒ funding agency ☐ other (explain) ☐

DEVELOPMENT

C.1. Standard: Goals and Objectives

The project should establish goals and objectives which are consistent with the broad philosophy and objectives of the project, and they should be measurable.

- C
- a. Have goals and objectives for the project been established and stated in measurable terms?

 Yes x No

While goals have been stated for the project, there has been some difficulty moving toward the statement of measurable objectives. This is brought about mostly by a semantic problem. Recently, however, we have made a significant breakthrough in this arena and well-stated objectives will be shortcoming.

- I
- a. Are specific objectives formulated for each facet of the project?

 x Yes No

In the process of being formulated. These are now complete through the development stage of the design model. Implementation objectives are being completed and refined.

- P
- a. Is there a plan for the systematic review and revision of objectives

 x Yes No
(Please specify)

Information in the form of rough objectives are passed on to the education staff by architecture and marketing staff. These pieces of information are reviewed and education staff will rework the information into the form of measurable objectives. These are then brought to general staff meetings and discussions follow regarding appropriateness of these restated objectives. Necessary modifications are made with the results being the desired objectives.

- P
- a. Is data available to support claims of movement towards objectives?

 x Yes No

See page 4b.

See Summative Evaluation Report Section of this report.

C

- b. Are the objectives consistent with the philosophy of the project?

☒ Yes ☐ No

Are goals drawn from the philosophy of the project?

☒ Yes ☐ No

I

- b. (1) If yes, are specific objectives formulated consistent with objectives of each curriculum area?

	Y	N	N/A
Edu- cation	x		
Archit- ecture	x		
Mar- keting	x		

- b. (2) If no, what is the basis of the project philosophy in the formulation of specific objectives?

P

- b. (1) If yes, is there a plan for the systematic review and revision of these objectives?

	Y	N	N/A
Education	x		
Architec- ture	x		
Marketing	x		

- b. (2) If no, can the inconsistencies between objectives be compensated for to allow the project to operate?

☐ Yes ☐ No
(Explain)

P

- b. Present all project goals and objectives below:

See page 7.

- c. How were the objectives defined?

☒ Subjectively
☒ Objectively
☒ Formally
☐ Other

Through staff meetings.

F-37

C.2. Standard: Curriculum

Realistic goals and objectives representing a complement or supplement to those already established by the separate disciplines of architecture, marketing, and/or education should be developed for the project.

C	I	P	P
a. Was the existing architecture, marketing and/or education curricular materials reviewed in developing project curriculum? <u> x </u> Yes <u> </u> No <i>This is an on-going process and will continue throughout the duration of the project.</i>	a. (1) If yes, does new material reinforce established curriculum, or does it expand curriculum into additional areas? <u> </u> x reinforce <u> </u> x expand <u> </u> x replace <u> </u> other a. (2) If no, what was the basis for the project curriculum?	a. Is there provision or plan for the gradual introduction of the innovative changes of the project into the existing architecture, marketing, and education materials? <u> </u> x Yes <u> </u> No <i>Very long range. Modification for other audiences.</i>	a. (1) Were the innovative changes incorporated into existing architecture, marketing, and education curriculum? <u> </u> Yes <u> </u> x No <i>But such incorporation is planned.</i> <i>**Such incorporation has now been achieved.</i> To what extent (state as a percent.) <u> </u> 20% a. (2) Did the incorporated innovations result in <u> </u> reinforcement? <u> </u> x extension? <u> </u> x replacement? <u> </u> other? <i>Those changes occurred prior to the first workshops. In addition after conducting each workshop. There were minimal curriculum changes made before the next workshops. There changes were made in order to make program components easier to understand by participants.</i>

C.3. Standard: Faculty and Staff Activities

The faculty and staff roles for performing their curricular tasks should be clearly defined.

- C
- a. Has staff been selected on the basis of curriculum needs?

☒ Yes ☐ No

- b. (1) Is there versatility in staff capabilities regarding project curriculum?

☒ Yes ☐ No

- b. (2) Is there flexibility in staff approach ref. project activities?

☒ Yes ☐ No

There were times in which no staff was needed in specific disciplines and more staff needed in other disciplines. Had this been anticipated at the onset of the project support staff would have been hired when needed most.

- I
- a. Are staff assignments and responsibilities clearly defined within educational program areas?

☒ Yes ☐ No

- b. Are staff members restricted in terms of inputs they can make to given project components?

	Y	N
Architecture	☐	☒
Marketing	☐	☒
Education	☐	☒

Explain restrictions.

- P
- a. Is there a systematic plan for assessing staff effectiveness in terms of project needs?

☒ Yes ☐ No

Describe the plan.

- b. Is there a plan for using individual abilities of staff for the benefit of the project?

☒ Yes ☐ No

Describe the plan or process employed.

Given the kinds of tasks to be completed during the project, different responsibilities are relegated to different staff members based on their expertise. See page 4a.

- P
- a. Is the staff effective in terms of curricular or project needs?

☒ Yes ☐ No

C.4. Standard: Resource Utilization

Resources for carrying out the project should be continually inventoried and their utilization evaluated on a continuing pattern.

C

a. Were the following kinds of resources inventoried for use in the project?

Personnel: Y N

Specialists x

Consultants x

General

Staff x

Other

I

a. (1) Are current records kept on all resource use?

 x Yes No

a. (2) Were additional resources needed and secured?

 x Yes No

And continues to be.

a. (3) Is there a plan for the evaluation of resources?

 x Yes No

Describe the plan.

Informal. Conducted by total staff.

P

a. (1) Are resource inventories available for:

 x Program planning

 x Staff use

 x Target population

 Other (specify)

a. (2) How is the information disseminated?

 Staff resource guides

 Library

 Publications

 Speaking engagements

 x Correspondence

 Audio-visual media

 x Other (specify)

staff meetings

*training programs for the target population

P

a. (1) Were resource evaluations effectively used?

 x Yes No

Thus far.

By whom:

 x Project staff

 x Evaluators

 Specialists

 Target population

 Other (specify)

C.5. Standard: Materials and Equipment

Materials and equipment needed for carrying out the project should be continually inventoried and their utilization evaluated on a continuing pattern.

C	I	P	P
a. Were the following kinds of materials and equipment inventoried for use in the project?	a. (1) Are concurrent records kept on all materials and equipment?	a. (1) Are materials and equipment inventories and evaluations available for:	a. Were materials and inventories and evaluations effectively used?
Y N	<u> x </u> Yes <u> </u> No		<u> x </u> Yes <u> </u> No
Office Supplies <u> x </u>		<u> x </u> Program planning	
A V Equipment <u> x </u>		<u> x </u> Staff use	
	a. (2) Is there a plan for the evaluation of materials and equipment?	<u> x </u> Evaluator use	By whom?
	<u> x </u> Yes <u> </u> No	<u> </u> Specialists use	<u> x </u> Project staff
	Describe the plan.	<u> </u> Other (specify)	<u> x </u> Evaluator
	<i>Informal by project staff.</i>		<u> </u> Specialists
	a. (3) Were all purchased materials and equipment found to be appropriate?	a. (2) How is the information disseminated?	<u> </u> Other
	<i>Both the video tape cassette players may not be needed as originally thought, given the other various audio-visual processes available through the media production company working with project materials.</i>	<u> </u> Materials and equipment guides	<u> </u> (specify)
		<u> </u> Library	
		<u> </u> Publications	
		<u> x </u> Other (specify)	
		<u> </u> Staff meetings	
		<u> </u> Staff correspondence	

APPENDIX G

SUMMATIVE EVALUATION

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Chapter 1

The Study Design

A before-after/test-control group study design was employed for this research project.

A total of four measurement periods are analyzed in this report--before, after, three to four months after, and eight to nine months after. In the case of the control group, all four surveys were conducted by mail with a random sample of builders in New Orleans. In the case of the test group, the first questionnaire was administered at the first session of the seminar, the second questionnaire at the end of the last seminar session, and the third and fourth questionnaires were sent to respondents in the mail. All questionnaires for each measurement period and for both test and control groups were self administered.

All persons attending the training seminar were included in the test group sample. A total of 22 respondents completed all four measurement period questionnaires.

The control group represents a random sample of all builders in the New Orleans area. The sample was drawn from the membership roster, Home Builders Association of Greater New Orleans, Inc., 1976-1977. A total of 20 respondents completed all four measurement period questionnaires.

Chapter 2

An Analysis of All Questions On The Survey

In this chapter, a summary of the data for all questions is presented. More detailed data is presented in the Statistical Appendix.

Table 1 in the Statistical Appendix shows that for two out of the three energy items the control group increased more than the test groups. But the test group rated the energy items higher in degree of importance. This comparison is made for periods one and four. In order to explain why the control group increased at a higher rate for the energy items, we would have to know more about what happened in the control city during the measurements period.

Table 2 shows that the test group increased substantially more in four out of the eleven items surveyed related to conserving energy in the home. The control group also increased substantially more in four out of the eleven items, and there was very little difference for three of the items.

Table 3 shows a rather mixed pattern and will require more data than was shown in the summary table to properly analyze the significance of the findings. There are some significant differences in terms of acceptance of certain materials between the two areas surveyed. For example: Builders in

the control area are significantly above average in using these materials: R-30 insulation in attic, 2x6 studs at 24 inch o/c, R-19 insulator in walls, and light colored paints for exterior walls; whereas, builders in the test area are above average on use of light colored asphalt shingles (but usage in control city is increasing at a fast rate), and double glass for windows.

Table 4 shows a mixed degree of change between the test and the control groups with regard to the correct types of roof types for houses in different climates.

Table 5 shows a significant increase among those in the test group who agree that wind may cause homes on the crest of a hill to lose three times as much energy as a similar home in a valley. There is almost no change in the control group.

Table 6 shows an increase in the number in the test group who disagree with this statement--the greater the absorption rating of a material the less solar heat it will allow to enter the building. But the increase in the control group is slightly higher.

Table 7 shows that the proportion in the test group who would select concrete block painted light color if they wanted a veneer in a hot climate that would absorb this heat during the day and emit more heat during the night increased by 9 percentage points. There was a 5 percentage change in the control group.

Table 8 shows a significant increase among the test group when asked to estimate how much external shading devices will reduce solar heat that would normally be transmitted through

a glass window pane. The average percentage among the test group increased from 14.00% to 16.00%; whereas, the control group decreased from 9.58% to 7.06% during the measurement period.

Table 9 shows that both test and control groups increased in rating white best in its ability to reflect solar radiation, and that both groups increased in voting black the worst. With regard to green and red, the direction of change in ratings is the same for both groups.

Table 10 should be evaluated from two points of view; First, what is the relative difference between the test and control areas in level of agreement or disagreement; and second, what is the change in agreement or disagreement from the base to the current measurement period. The proportion agreeing that a single story dwelling uses less energy than a two story house decreased in the control group and stayed the same in the test group. Agreement with the statement about the importance of natural cover of the ground increased significantly more in the test group. Knowledge of sun shading devices increased more among the test group. Agreement that a 40% reduction in energy used can be achieved with suitable ceiling and wall insulation increased greatly among the test group but decreased among the control group. All builders in the control group disagree with the statement that building shapes have little or no effect on the heating or cooling load generated on a building, but in the control group only eight out of ten disagree with this statement.

Table 11 evaluates the opinion of respondents with regard to selected actions that could be taken to conserve energy in the design and construction of single family houses. Among the test group the trend in the number who consider the

following actions to be effective is increasing more than it is among the control group:

- Change roof material to one that is more energy efficient
- Incorporate natural ventilation of rooms into home plan
- Layout subdivisions considering wind pattern
- Minimize paved area on the building lot

And for these actions, the trend favors the control group.

- Orient the house on the lot in consideration of sun
- Change shape of the house you build
- Use proper type shading for exposed glass areas
- Apply lighter colors in interior spaces

In evaluating the data in Table 11, one should take note of the fact that persons in the test group generally rated all items as being more effective on the first survey than did persons in the control group.

Table 12 evaluates what builders are either now doing or planning to do in the future to incorporate energy saving materials and design features into their building plans.

The test group ranks ahead of the control group in the trend of how many are either doing or planning to do the following:

- Change shape of the house you build
- Use proper type of shading for exposed glass areas

The control group ranks ahead on the following:

- Incorporate natural ventilation of rooms into home plan
- Apply lighter colors in interior spaces used in daytime
- Minimize paved areas on the building lot
- Layout subdivision considering wind pattern for natural ventilation

Table 13 shows that for the three marketing strategies surveyed the control group has increased more in expressing the opinion that such strategies would be effective. But it is important to note that persons in the test group rated the three marketing strategies significantly more effective on the first survey than did persons in the control group.

Table 14 shows that the control group ranks ahead of the test group in terms of increasing numbers who now do or plan to use the following marketing strategies:

- Provide the prospective buyer with an energy consumption analysis of the house

- Point out the energy saving features of the house you build

- Use audio-visual materials to communicate energy saving advantages

A more detailed presentation of the data discussed in this chapter may be found in the Statistical Appendix at the back of this report.

Chapter 3

Testing of Hypotheses

The object of this research is to find out what effects the experimental learning package has had on the knowledge, attitude, and behavior of participants with respect to energy conservation in home building. Prior evidence suggests that gains are to be expected in terms of increased knowledge, more favorable attitudes, and greater likelihood of practicing energy conservation measures in home building.

In order to test hypotheses, a total score for each respondent was developed for each of these three components--Knowledge, Attitude, and Behavior. Since a large number of questions were included on the questionnaire, they were grouped into the three components just identified. Since this method of analysis had not been anticipated, different scales were used for various questions. In order to overcome this problem, the data was recorded to produce a seven-point scale or a "7" for correct and a "0" for incorrect. Then all the questions related to attitude were summed to produce a total attitude score for each respondent for each of the four measurement periods. This same procedure was followed for the knowledge component questions and for the behavior component questions.

Table 3-1 shows the trend in the average scores for each component (knowledge, attitude, behavior) from measurement period one through four for both the control and test groups.

Table 3-1

A Tabulation Of The Combined Value Of Scales Used To Evaluate The Knowledge, Attitudes, And Behavior Of The Test And Control Groups

****Average Score Values****

	Test Group Surveys				Control Group Surveys			
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Total Observations	<u>22</u>	<u>22</u>	<u>22</u>	<u>22</u>	<u>20</u>	<u>20</u>	<u>20</u>	<u>20</u>
Knowledge Score	84.64	90.36	85.91	94.18	77.00	81.55	77.00	82.2
Attitude Score	137.55	148.64	149.45	147.18	122.00	127.15	131.95	134.6
Behavior Score	58.73	61.73	67.45	62.45	57.20	61.55	62.95	63.4

020

Note:-----High Value Of Scales Indicate A Favorable Or Positive Attitude Or Behavior.
And High Values Indicate Correct Knowledge.

The hypotheses tested in this report are stated below:

1. There will be no gain in knowledge of energy conservation practices in home building exhibited by participants as a result of participation in the Home Energy Conservation workshops.
2. There will be no gain in attitude favorable toward energy conservation in home building exhibited by participants as a result of participation in the Home Energy Conservation workshops.
3. There will be no gain in disposition to behavior favorable toward energy conservation in home building exhibited by participants as a result of participation in the Home Energy Conservation workshops.

Table 3-2 on the following page presents a 1 x 1 Analysis of Variance Test of the three hypotheses. This analysis indicates that at the 95% confidence level there was a favorable change in the attitude and knowledge components between measurement periods one and four, and that there was not a significant change among respondents in the control group during this same period.

Table 3-2

1 x 1 Analysis of Variance

<u>Hypothesis</u>	<u>Group/Measurement Period/(Mean Score)^{1/}</u>	<u>F Ratio</u>
1. Knowledge	T1 (84.6) vs. T4 (94.2)	2.37 *
2. Attitude	T1 (137.5) vs. T4 (147.2)	2.99 *
3. Behavior	T1 (58.7) vs. T4 (62.4)	0.71
1. Knowledge	C1 (77.0) vs. C4 (82.3)	1.04
2. Attitude	C1 (122.0) vs. C4 (134.7)	1.19
3. Behavior	C1 (57.2) vs. C4 (63.4)	1.12
1. Knowledge	T1 (84.6) vs. C1 (77.0)	1.31
2. Attitude	T1 (137.5) vs. C1 (122.0)	0.82
3. Behavior	T1 (58.7) vs. C1 (57.2)	1.15
1. Knowledge	T4 (94.2) vs. C4 (82.2)	0.58
2. Attitude	T4 (147.2) vs. C4 (134.7)	0.33
3. Behavior	T4 (62.4) vs. C4 (63.4)	1.80

* Significant at 0.05 level

^{1/} Definitions are as follows:

- T = Test group
- C = Control group
- 1 = First Survey
- 2 = Second Survey
- 3 = Third Survey
- 4 = Fourth Survey

A 2 X 2 Analysis of Variance is presented in Table 3-3 on the following page. There is a highly significant difference for each of the attitude models tested. And there is a significant difference for the knowledge model that evaluated the difference between the first and fourth measurement periods.

In summary, it appears that the experimental learning package was probably effective in increasing knowledge and definitely effective in improving attitudes related to the conservation of energy in home building. It was not (or has not been as yet) effective in changing behavior; but in the short run and in light of the many variables, this is to be expected.

Table 3-3
2 x 2 Analysis of Variance

<u>Hypothesis</u>	<u>Model</u> <u>1/</u>	<u>F Valve</u>	<u>Probability of F Valve</u>
1. Knowledge	T1 T2 C1 C2	2.52	.0624
2. Attitude	T1 T2 C1 C2	12.81 *	.0000
3. Behavior	T1 T2 C1 C2	.18	.9093
1. Knowledge	T1 T3 C1 C3	1.61	.1918
2. Attitude	T1 T3 C1 C3	11.02 *	.0000
3. Behavior	T1 T3 C1 C3	.75	.5261
1. Knowledge	T1 T4 C1 C4	4.43 *	.0064
2. Attitude	T1 T4 C1 C4	9.28 *	.0000
3. Behavior	T1 T4 C1 C4	.27	.8441

* Significant at 0.05 level

1/ Definitions are as follows

T = Test group
 C = Control group
 1 = First Survey
 2 = Second Survey
 3 = Third Survey
 4 = Fourth Survey

Appendix A

Tabulation of All Questions

TABLE 1 IMPORTANCE OF FACTORS THAT MIGHT INFLUENCE A NEW HOME SHOPPER TO BUY FROM A SPECIFIC BUILDER

	-----TEST GROUP-----				*-----CONTROL GROUP-----*			
	-----SURVEY-----				*-----SURVEY-----*			
	1	2	3	4	1	2	3	4
BASE (NUMBER OF RESPONDENTS)	22	22	22	22	20	20	20	20
AVERAGE RATING GIVEN FACTOR...								
BUILDER'S REPUTATION	4.64	4.09	4.27	4.55	4.95	5.05	4.85	5.20
TOTAL PRICE OF HOUSE	5.18	5.09	5.27	5.18	5.47	5.50	5.70	5.45
ENERGY SAVING DESIGN FEATURES	4.45	4.82	5.09	4.91	3.70	3.80	4.30	4.40
EFFICIENCY RATING OF CENTRAL AIR	4.00	4.45	4.91	4.91	3.65	3.55	4.20	4.15
AMOUNT AND TYPE OF INSULATION	4.82	5.00	5.27	5.36	3.95	4.05	4.70	4.65
LANDSCAPING	2.91	3.73	4.00	4.00	2.42	2.70	2.85	2.80

001

SCALE 6 = EXTREMELY IMPORTANT
1 = EXTREMELY UNIMPORTANT

TABLE 2 RATING OF IMPORTANCE OF SPECIFIC ITEMS ON CONSERVING ENERGY IN A NEW HOME

	-----TEST GROUP-----					*-----CONTROL GROUP-----*			
	-----SURVEY-----					*-----SURVEY-----*			
	1	2	3	4		1	2	3	4
BASE (NUMBER OF RESPONDENTS)	22	22	22	22		20	20	20	20
WHETHER AGREE OR DISAGREE AVERAGE RATING FOR EACH ITEM...									
LIGHT COLOR EXTERIOR WALLS	3.70	4.82	4.73	5.00		3.95	4.20	4.35	4.35
LIGHT COLOR ROOF	4.10	5.55	4.91	5.18		4.05	4.45	4.74	4.40
INSULATION OF ATTIC AND WALLS	5.73	6.00	5.91	5.82		5.70	5.90	5.84	5.95
AMOUNT/LOCATION OF WINDOWS/DOORS GLASS	5.64	5.73	5.82	5.55		4.58	5.15	5.00	4.95
PROPER LIGHTING DESIGN	4.00	4.45	4.64	4.82		3.80	3.85	3.75	4.15
VENTILATION OF ATTIC SPACE	5.36	5.27	5.18	5.27		5.20	5.10	5.30	5.40
LOCATION OF OUTSIDE VEGETATION	4.40	4.82	5.18	4.82		3.65	3.90	4.00	4.10
SITING OF UNIT ON LOT RELATION TO SUN	4.82	5.27	5.18	5.27		3.72	4.10	4.15	4.20
SHAPE OF BUILDING	4.64	4.82	4.82	4.91		3.37	3.95	3.70	3.90
NATURAL VENTILATION OF ROOMS	4.45	4.91	5.00	5.27		3.40	3.75	3.90	4.15
LARGE AMOUNT OF GLASS AREA THAT CAN BE SHADED IN SUMMER/EXPOSED WINTER	4.55	4.64	4.36	4.91		3.61	3.60	4.25	4.00

002

SCALE 6 = EXTREMELY IMPORTANT
1 = EXTREMELY UNIMPORTANT

TABLE 3 BUILDING MATERIALS NOW USE OR PLAN TO USE IN NEXT 12- MONTHS

	-----TEST GROUP-----				*-----CONTROL GROUP-----*			
	-----SURVEY-----				*-----SURVEY-----*			
	1	2	3	4	1	2	3	4
BASE (NUMBER OF RESPONDENTS)	22	22	22	22	20	20	20	20
USE OF SELECTED BUILDING MATERIAL...								
ROOFING MATERIALS								
R-30 INSULATION IN ATTIC...								
NOW USE REGULARLY	18.2	9.1	18.2	9.1	50.0	55.0	35.0	45.0
PLAN TO USE REGULARLY	18.2	9.1	27.3	27.3	45.0	40.0	40.0	30.0
LIGHT COLOR ASPHALT SHINGLES...								
NOW USE REGULARLY	45.5	36.4	36.4	54.5	5.0	10.0	20.0	20.0
PLAN TO USE REGULARLY	45.5	36.4	36.4	36.4	5.0	15.0	15.0	10.0
CLAY TILE FOR ROOF COVERING...								
NOW USE REGULARLY	9.1	-	9.1	-	-	-	-	-
PLAN TO USE REGULARLY	9.1	-	-	9.1	-	-	-	-
WALLS								
8 INCH CONCRETE BLOCK...								
NOW USE REGULARLY	-	-	9.1	-	-	5.0	-	-
PLAN TO USE REGULARLY	-	-	-	9.1	-	-	-	-
ADOBE...								
NOW USE REGULARLY	-	-	-	-	-	-	-	-
PLAN TO USE REGULARLY	-	-	-	-	-	-	-	-
2x6 STUDS AT 24 INCH O/C...								
NOW USE REGULARLY	-	-	9.1	-	20.0	5.0	20.0	15.0
PLAN TO USE REGULARLY	-	9.1	-	-	20.0	5.0	15.0	-
R-19 INSULATION...								
NOW USE REGULARLY	9.1	18.2	18.2	18.2	40.0	60.0	60.0	50.0
PLAN TO USE REGULARLY	18.2	27.3	36.4	9.1	40.0	50.0	50.0	25.0
DOUBLE GLASS FOR WINDOWS...								
NOW USE REGULARLY	36.4	36.4	54.5	36.4	5.0	5.0	10.0	10.0
PLAN TO USE REGULARLY	36.4	27.3	54.5	36.4	10.0	10.0	15.0	10.0
LIGHT COLORED PAINT FOR EXT.SURFACES								
NOW USE REGULARLY	27.3	27.3	27.3	36.4	35.0	40.0	30.0	40.0
PLAN TO USE REGULARLY	27.3	45.5	54.5	27.3	25.0	35.0	20.0	20.0
FLOORS								
4 INCH CONCRETE ON 1 1/2 INCH								
COCONSTRUCTION GRADE UNSUL.FOR FLOOR								
NOW USE REGULARLY	9.1	9.1	-	-	30.0	30.0	30.0	25.0
PLAN TO USE REGULARLY	27.3	45.5	9.1	18.2	25.0	35.0	25.0	10.0

TABLE 4 CORRECT ROOF TYPE FOR HOMES IN DIFFERENT CLIMATES

	-----TEST GROUP-----				*-----CONTROL GROUP-----*			
	-----SURVEY-----				*-----SURVEY-----*			
	1	2	3	4	1	2	3	4
BASE (NUMBER OF RESPONDENTS)	22	22	22	22	20	20	20	20
A HOME IN A COLD AREA SHOULD HAVE THIS TYPE OF ROOF...								
STEEP PITCHED	72.7	63.6	63.6	63.6	65.0	75.0	80.0	75.0
SLIGHTLY PITCHED	18.2	27.3	18.2	36.4	10.0	10.0	10.0	20.0
SLIGHT PITCH WITH OVER HANG	9.1	9.1	9.1	-	10.0	5.0	-	-
A HOME IN A HOT-ARID AREA SHOULD HAVE THIS TYPE OF ROOF...								
STEEP PITCHED	9.1	-	18.2	18.2	10.0	-	-	5.0
SLIGHTLY PITCHED	36.4	27.3	27.3	18.2	30.0	25.0	35.0	30.0
SLIGHT PITCH WITH OVER HANG	54.5	72.7	45.5	63.6	45.0	60.0	55.0	60.0
A HOME IN A HOT-HUMID AREA SHOULD HAVE THIS TYPE OF ROOF...								
STEEP PITCHED	9.1	27.3	18.2	36.4	5.0	-	-	10.0
SLIGHTLY PITCHED	36.4	9.1	18.2	18.2	10.0	15.0	15.0	15.0
SLIGHT PITCH WITH OVER HANG	54.5	63.6	63.6	45.5	75.0	80.0	80.0	75.0

TABLE 5 WHETHER EXPOSURE TO WIND MAY COST THE HOMES LOCATED ON THE CREST OF A HILL TO LOSE THREE TIMES AS MUCH HEAT AS SIMILAR ONES IN THE VALLEY

	-----TEST GROUP-----				*-----CONTROL GROUP-----*			
	-----SURVEY-----				*-----SURVEY-----*			
	1	2	3	4	1	2	3	4
BASE (NUMBER OF RESPONDENTS)	22	22	22	22	20	20	20	20
OPINION ON ABOVE STATEMENT...								
AGREE	63.6	81.8	81.8	100.0	55.0	60.0	45.0	50.0
NOT SURE	36.4	18.2	9.1	-	40.0	35.0	45.0	45.0
DISAGREE	-	-	9.1	-	5.0	5.0	10.0	5.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

005

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TABLE 6 WHETHER THE GREATER THE ABSORPTIVITY RATING OF A MATERIAL THE LESS SOLAR HEAT IT WILL ALLOW TO ENTER THE BUILDING

	-----TEST GROUP-----				*-----CONTROL GROUP-----*			
	-----SURVEY-----				*-----SURVEY-----*			
	1	2	3	4	1	2	3	4
BASE (NUMBER OF RESPONDENTS)	22	22	22	22	20	20	20	20
OPINION ON ABOVE STATEMENT...								
AGREE	18.2	9.1	18.2	18.2	15.0	30.0	15.0	20.0
NOT SURE	9.1	-	-	-	40.0	20.0	30.0	20.0
DISAGREE	72.7	90.9	81.8	81.8	45.0	50.0	55.0	60.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

006

TABLE 7 TYPE OF VENEER WOULD CHOOSE FOR A HOT CLIMATE IF YOU WANTED TO ABSORB LESS HEAT DURING THE DAY AND
EMIT MORE HEAT DURING THE NIGHT

	-----TEST GROUP-----				*-----CONTROL GROUP-----*			
	-----SURVEY-----				*-----SURVEY-----*			
	1	2	3	4	1	2	3	4
BASE (NUMBER OF RESPONDENTS)	22	22	22	22	20	20	20	20
WOULD CHOOSE THIS VENEER...								
DARK RED BRICK	27.3	-	-	-	5.0	5.0	5.0	5.0
CONCRETE BLOCK PAINTED LIGHT COLOR	18.2	27.3	27.3	27.3	15.0	15.0	15.0	20.0
WHITE BRICKS	45.4	63.6	72.7	63.6	80.0	65.0	75.0	65.0
WOOD SIDING PAINTED GRAY	9.1	9.1	-	9.1	-	5.0	5.0	20.0
NONE OF ABOVE MENTIONED	-	-	-	-	-	10.0	-	-
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	110.0

007

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TABLE 8 PER CENT WHICH EXTERNAL SHADING DEVICES WILL REDUCE SOLAR HEAT TRANSMISSION

	-----TEST GROUP-----				*-----CONTROL GROUP-----*			
	-----SURVEY-----				*-----SURVEY-----*			
	1	2	3	4	1	2	3	4
BASE (NUMBER OF RESPONDENTS)	22	22	22	22	20	20	20	20
PER CENT TRANSMISSION REDUCED...								
NONE	-	-	-	-	-	-	-	-
1-9	-	-	-	-	-	-	-	-
10-19	-	-	-	-	-	-	10.0	5.0
20-29	9.1	9.1	9.1	-	10.0	5.0	15.0	20.0
30-39	18.2	18.2	9.1	9.1	-	15.0	10.0	10.0
40-49	9.1	-	-	-	10.0	15.0	15.0	10.0
50-59	27.2	27.2	27.2	18.2	30.0	20.0	25.0	25.0
60-69	9.1	27.3	18.2	36.3	-	5.0	10.0	5.0
70-79	-	9.1	9.1	-	10.0	5.0	-	5.0
80-89	18.2	9.1	-	9.1	-	-	-	5.0
90-100	9.1	-	27.3	18.2	-	5.0	-	-
NOT REPORTED	-	-	-	9.1	40.0	30.0	15.0	15.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
AVERAGE PER CENT	14.00	10.09	31.00	16.00	9.58	1.21	13.12	7.06

TABLE 9 COLOR SURFACES RANKED IN TERMS OF THEIR REFLECTIVENESS

	-----TEST GROUP-----				*-----CONTROL GROUP-----*			
	-----SURVEY-----				*-----SURVEY-----*			
	1	2	3	4	1	2	3	4
BASE (NUMBER OF RESPONDENTS)	22	22	22	22	20	20	20	20
SURFACE COLOR OF ROOF RANKED IN TERMS OF REFLECTIVENESS...								
WHITE	1.27	1.00	1.00	1.00	1.47	1.16	1.30	1.15
GREEN	2.27	2.09	2.55	2.18	2.26	2.16	2.30	2.10
RED	2.73	2.91	2.45	2.82	2.79	2.84	2.75	2.90
BLACK	3.73	4.00	4.00	4.00	3.53	3.84	3.70	3.85

009

RANK 1 = BEST 4 = WORST

TABLE 10 OPINION ON SELECTED STATEMENTS

		-----TEST GROUP-----				*-----CONTROL GROUP-----*				
		-----SURVEY-----				*-----SURVEY-----*				
		1	2	3	4	1	2	3	4	
BASE (NUMBER OF RESPONDENTS)		22	22	22	22	20	20	20	20	
WHETHER AGREE OR DISAGREE WITH THE FOLLOWING STATEMENTS...										
a.	A single story dwelling uses less energy for heating and cooling per square foot of area than a two story house.	AGREE	27.3	36.4	27.3	27.3	40.0	30.0	35.0	35.0
		DON'T KNOW	9.1	9.1	27.3	18.2	10.0	5.0	15.0	-
		DISAGREE	63.6	54.5	45.5	54.5	50.0	65.0	50.0	65.0
b.	The natural cover of ground (grass, plants) as opposed to man-made (asphalt, concrete, etc.) tends to stabilize temperatures and decrease extreme variation in temperatures around the house.	AGREE	81.8	100.0	90.9	100.0	90.0	90.0	95.0	95.0
		DON'T KNOW	18.2	-	9.1	-	10.0	5.0	-	-
		DISAGREE	-	-	-	-	-	5.0	5.0	5.0
c.	For proper natural ventilation, the position of the openings on walls is not important.	AGREE	-	-	9.1	-	5.0	5.0	-	-
		DON'T KNOW	9.1	-	9.1	-	-	-	5.0	-
		DISAGREE	90.9	100.0	81.8	100.0	95.0	95.0	95.0	100.0
d.	Any one type of sun shading device can be effective on all sides of a house.	AGREE	18.2	18.2	9.1	-	35.0	25.0	45.0	30.0
		DON'T KNOW	18.2	-	9.1	-	10.0	15.0	5.0	20.0
		DISAGREE	63.6	81.8	81.8	100.0	55.0	60.0	50.0	50.0
e.	A 40% reduction in energy use can be achieved by adding suitable ceiling and wall insulation and storm windows.	AGREE	63.6	72.7	63.6	81.8	85.0	80.0	75.0	75.0
		DON'T KNOW	27.3	9.1	36.4	18.2	15.0	15.0	20.0	25.0
		DISAGREE	9.1	18.2	-	-	-	5.0	5.0	-
f.	As the thickness of insulation is increased, you get a corresponding and equal reduction in heat loss or gain.	AGREE	9.1	36.4	9.1	9.1	55.0	50.0	55.0	45.0
		DON'T KNOW	-	9.1	9.1	-	15.0	10.0	10.0	-
		DISAGREE	90.9	54.5	81.8	90.9	30.0	40.0	35.0	55.0
g.	Light colors reflect heat; dark colors absorb heat.	AGREE	100.0	100.0	90.9	100.0	100.0	100.0	100.0	100.0
		DON'T KNOW	-	-	9.1	-	-	-	-	-
		DISAGREE	-	-	-	-	-	-	-	-
h.	Outside shading in the form of overhangs, screen walls, and awnings are approximately twice as efficient as interior shading in the form of curtains, blinds, and shades.	AGREE	100.0	90.9	90.9	100.0	70.0	85.0	50.0	75.0
		DON'T KNOW	-	-	9.1	-	25.0	5.0	35.0	10.0
		DISAGREE	-	9.1	-	-	5.0	10.0	15.0	15.0
i.	Building shapes have little or no effect on the heating or cooling load generated on a building.	AGREE	-	-	-	-	10.0	20.0	25.0	10.0
		DON'T KNOW	-	-	9.1	-	10.0	10.0	5.0	10.0
		DISAGREE	100.0	100.0	90.9	100.0	80.0	70.0	70.0	80.0

TABLE 11 RATING OF EFFECTIVENESS OF ACTIONS THAT COULD BE TAKEN TO CONSERVE ENERGY IN THE DESIGN AND CONSTRUCTION OF SINGLE FAMILY HOUSES

	-----TEST GROUP-----				*-----CONTROL GROUP-----*			
	-----SURVEY-----				*-----SURVEY-----*			
	1	2	3	4	1	2	3	4
BASE (NUMBER OF RESPONDENTS)	22	22	22	22	20	20	20	20
•AVERAGE RATING FOR EFFECTIVENESS•								
CHANGE ROOF MATERIAL TO ONE THAT IS MORE ENERGY EFFICIENT...	2.18	1.45	2.00	2.09	2.00	2.10	2.25	2.30
INCORPORATE NATURAL VENTILATION OF ROOMS INTO HOME PLAN...	1.90	1.64	1.80	1.82	2.20	2.25	2.40	2.25
CHANGE THE SHAPE OF THE HOUSE YOU BUILD...	2.36	2.09	2.20	2.55	3.15	2.90	3.15	2.85
USE PROPER TYPE SHADING FOR EXPOSED GLASS AREAS (WINDOWS & GLASS DOORS)...	1.73	1.36	1.40	2.18	2.10	2.20	2.10	2.15
ORIENT THE HOUSE ON THE LOT IN CONSIDERATION OF SUN...	1.82	1.64	1.60	1.91	2.55	2.40	2.20	2.15
LAYOUT SUBDIVISIONS CONSIDERING WIND PATTERN FOR NATURAL VENTILATION...	2.60	1.91	2.10	2.45	2.75	3.00	2.55	2.55
APPLY LIGHTER COLORS IN INTERIOR SPACES USED IN THE DAYTIME...	2.55	1.91	2.10	2.73	2.90	2.65	2.60	2.60
MINIMIZE PAVED AREAS ON THE BUILDING LOT...	2.45	2.00	1.90	2.09	2.47	2.20	2.15	2.20

011

SCALE 1 = EXTREMELY EFFECTIVE
5 = EXTREMELY INEFFECTIVE

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TABLE 12 WHICH OF THE FOLLOWING DO YOU PLAN TO INCORPORATE INTO YOUR BUILDING PLANS (FINANCE REQUIREMENTS) WITHIN THE NEXT 12-MONTHS

	-----TEST GROUP-----				*-----CONTROL GROUP-----*			
	-----SURVEY-----				*-----SURVEY-----*			
	1	2	3	4	1	2	3	4
BASE (NUMBER OF RESPONDENTS)	22	22	22	22	20	20	20	20
TYPE OF ACTION								
CHANGE ROOF MATERIALS TO ONE THAT IS MORE ENERGY EFFICIENT...								
NOW DO SO	9.1	18.2	18.2	27.3	15.0	5.0	20.0	20.0
WILL DO IN FUTURE	18.2	18.2	36.4	18.2	20.0	30.0	40.0	35.0
NOT SURE	54.5	54.5	27.3	36.4	25.0	30.0	10.0	25.0
WILL NOT DO IN FUTURE	18.2	9.1	18.2	18.2	40.0	35.0	30.0	20.0
INCORPORATE NATURAL VENTILATION OF ROOMS INTO HOME PLANS...								
NOW DO SO	27.3	18.2	18.2	36.4	25.0	15.0	20.0	35.0
WILL DO IN FUTURE	36.4	36.4	36.4	27.3	35.0	50.0	45.0	45.0
NOT SURE	36.4	36.4	27.3	27.3	15.0	15.0	10.0	5.0
WILL NOT DO IN FUTURE	-	9.1	18.2	9.1	25.0	20.0	25.0	15.0
CHANGE SHAPE OF THE HOUSE YOU BUILD...								
NOW DO SO	-	9.1	18.2	18.2	-	10.0	10.0	10.0
WILL DO IN FUTURE	9.1	18.2	18.2	36.4	15.0	10.0	5.0	20.0
NOT SURE	54.5	54.5	36.4	27.3	30.0	25.0	25.0	35.0
WILL NOT DO IN FUTURE	36.4	18.2	27.3	18.2	55.0	55.0	60.0	35.0
USE PROPER TYPE OF SHADING FOR EXPOSED GLASS AREAS (WINDOWS & GLASS DOORS)...								
NOW DO SO	18.2	9.1	9.1	36.4	20.0	5.0	10.0	15.0
WILL DO IN FUTURE	36.4	36.4	36.4	9.1	20.0	25.0	35.0	25.0
NOT SURE	36.4	45.5	36.4	27.3	25.0	30.0	25.0	10.0
WILL NOT DO IN FUTURE	9.1	9.1	18.2	27.3	35.0	40.0	30.0	50.0
ORIENT THE HOUSE ON THE LOT IN CONSIDERATION OF SUN...								
NOW DO SO	-	-	-	-	20.0	5.0	15.0	20.0
WILL DO IN FUTURE	45.5	45.5	54.5	27.3	15.0	25.0	25.0	20.0
NOT SURE	45.5	36.4	36.4	54.5	15.0	20.0	10.0	10.0
WILL NOT DO IN FUTURE	9.1	18.2	9.1	18.2	50.0	50.0	50.0	50.0
LAYOUT SUB DIVISION CONSIDERING WIND PATTERN FOR NATURAL VENTILATION...								
NOW DO SO	-	-	-	-	10.0	-	5.0	5.0
WILL DO IN FUTURE	27.3	18.2	18.2	9.1	15.0	15.0	20.0	30.0
NOT SURE	45.5	45.5	63.6	54.5	15.0	30.0	30.0	15.0
WILL NOT DO IN FUTURE	27.3	36.4	18.2	36.4	60.0	55.0	45.0	50.0

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TABLE 12 WHICH OF THE FOLLOWING DO YOU PLAN TO INCORPORATE INTO YOUR BUILDING PLANS (FINANCE REQUIREMENTS) WITHIN THE NEXT 12-MONTHS

	-----TEST GROUP-----				*-----CONTROL GROUP-----*			
	-----SURVEY-----				*-----SURVEY-----*			
	1	2	3	4	1	2	3	4
APPLY LIGHTER COLORS IN INTERIOR SPACES USED IN THE DAYTIME...								
NOW DO SO	27.3	18.2	36.4	36.4	55.0	50.0	75.0	75.0
WILL DO IN FUTURE	27.3	36.4	27.3	27.3	20.0	25.0	20.0	20.0
NOT SURE	27.3	36.4	27.3	27.3	10.0	5.0	-	5.0
WILL NOT DO IN FUTURE	18.2	9.1	9.1	9.1	15.0	20.0	5.0	-
MINIMIZE PAVED AREAS ON THE BUILDING LOT...								
NOW DO SO	18.2	9.1	18.2	36.4	25.0	50.0	60.0	60.0
WILL DO IN FUTURE	27.3	36.4	36.4	9.1	50.0	40.0	25.0	35.0
NOT SURE	27.3	45.5	27.3	27.3	10.0	5.0	-	-
WILL NOT DO IN FUTURE	27.3	9.1	18.2	27.3	15.0	5.0	15.0	5.0

012

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TABLE 13 RATING OF EFFECTIVENESS OF MARKETING STRATEGIES IN SELLING HOUSES TO CONSUMERS DURING THE NEXT 12-MONTHS

	-----TEST GROUP-----				*-----CONTROL GROUP-----*			
	-----SURVEY-----				*-----SURVEY-----*			
	1	2	3	4	1	2	3	4
BASE (NUMBER OF RESPONDENTS)	22	22	22	22	20	20	20	20
AVERAGE RATING OF EFFECTIVENESS								
PROVIDE THE PROSPECTIVE BUYER WITH ENERGY CONSUMPTION ANALYSIS OF THE HOUSE	2.09	2.38	2.09	2.11	2.83	2.80	2.45	2.16
POINT OUT THE ENERGY SAVING FEATURES OF THE HOUSE YOU BUILD...	1.55	1.63	1.64	1.44	2.39	2.40	2.05	1.75
USE AUDIO-VISUAL MATERIALS TO COMMUNICATE ENERGY SAVING ADVANTAGES...	2.09	2.67	2.18	2.56	3.11	3.39	2.84	2.42

013

SCALE 1 = EXTREMELY EFFECTIVE
6 = EXTREMELY INEFFECTIVE

TABLE 14 WHICH OF THE FOLLOWING DO YOU PLAN TO INCORPORATE IN YOUR MARKETING PLAN TO SELL HOMES

	-----TEST GROUP-----				*-----CONTROL GROUP-----*			
	-----SURVEY-----				*-----SURVEY-----*			
	1	2	3	4	1	2	3	4
BASE (NUMBER OF RESPONDENTS)	22	22	22	22	20	20	20	20
TYPE OF PLAN								
PROVIDE THE PROSPECTIVE BUYER WITH ENERGY CONSUMPTION ANALYSIS OF THE HOUSE								
NOW DO SO	-	-	-	9.1	10.0	10.0	10.0	25.0
WILL DO IN FUTURE	45.5	45.5	36.4	-	20.0	45.0	45.0	25.0
NOT SURE	45.5	45.5	45.5	81.8	20.0	20.0	15.0	20.0
WILL NOT DO IN FUTURE	9.1	9.1	18.2	9.1	50.0	25.0	30.0	30.0
POINT OUT THE ENERGY SAVING FEATURES OF THE HOUSE YOU BUILD...								
NOW DO SO	36.4	9.1	45.5	45.5	35.0	40.0	55.0	50.0
WILL DO IN FUTURE	27.3	63.6	18.2	18.2	40.0	40.0	30.0	40.0
NOT SURE	36.4	27.3	36.4	36.4	25.0	5.0	10.0	5.0
WILL NOT DO IN FUTURE	-	-	-	-	-	15.0	5.0	5.0
USE AUDIO-VISUAL MATERIALS TO COMMUNICATE ENERGY SAVING ADVANTAGES...								
NOW DO SO	9.1	-	-	9.1	5.0	-	5.0	-
WILL DO IN FUTURE	27.3	18.2	18.2	9.1	5.0	20.0	20.0	20.0
NOT SURE	45.5	54.5	54.5	54.5	30.0	15.0	15.0	5.0
WILL NOT DO IN FUTURE	18.2	27.3	27.3	27.3	60.0	65.0	60.0	75.0

Appendix B

1 X 1 Analysis of Variance

HYPOTHESIS 1

There will be no gain in knowledge of energy conservation practices in homebuilding exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 22$ $\bar{X}_1 = 84.63$ $s_1 = 18.44$
 $N_2 = 20$ $\bar{X}_2 = 77.00$ $s_2 = 16.05$

DEGREES OF FREEDOM: $N_1 = 21$ $N_2 = 19$

F VALUE: $5\% = 2.14$ $1\% = 2.98$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{22(18.44)^2}{22-1} \times \frac{20-1}{20(16.05)^2}$$

$$F = 1.31$$

C1 - C4

HYPOTHESIS 1

There will be no gain in knowledge of energy conservation practices in homebuilding exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 20$ $\bar{X}_1 = 77.00$ $s_1 = 16.05$
 $N_2 = 20$ $\bar{X}_2 = 82.25$ $s_2 = 15.71$

DEGREES OF FREEDOM: $N_1 = 19$ $N_2 = 19$

F VALUE: $5\% = 2.16$ $1\% = 3.02$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{20(16.05)^2}{20-1} \times \frac{20-1}{20(15.71)^2}$$

$$F = 1.04$$

HYPOTHESIS 1

There will be no gain in knowledge of energy conservation practices in homebuilding exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 22$ $\bar{X}_1 = 84.63$ $s_1 = 18.44$
 $N_2 = 22$ $\bar{X}_2 = 94.18$ $s_2 = 11.97$

DEGREES OF FREEDOM: $N_1 = 21$ $N_2 = 21$

F VALUE: 5% = 2.08 1% = 2.86

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{22(18.44)^2}{22-1} \times \frac{22-1}{22(11.97)^2}$$

$$F = 2.37$$

HYPOTHESIS 1

There will be no gain in knowledge of energy conservation practices in homebuilding exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 20$ $\bar{X}_1 = 77.00$ $s_1 = 16.05$
 $N_2 = 20$ $\bar{X}_2 = 81.55$ $s_2 = 16.73$

DEGREES OF FREEDOM: $N_1 = 19$ $N_2 = 19$

F VALUE: $5\% = 2.16$ $1\% = 3.02$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{20(16.05)^2}{20-1} \times \frac{20-1}{20(16.73)^2}$$

$$F = 0.92$$

HYPOTHESIS 1

There will be no gain in knowledge of energy conservation practices in homebuilding exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 22$ $\bar{X}_1 = 84.63$ $s_1 = 18.44$
 $N_2 = 22$ $\bar{X}_2 = 90.36$ $s_2 = 13.12$

DEGREES OF FREEDOM: $N_1 = 21$ $N_2 = 21$

F VALUE: $5\% = 2.08$ $1\% = 2.86$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{22(18.44)^2}{22-1} \quad \frac{22-1}{22(13.12)^2}$$

$$F = 1.98$$

HYPOTHESIS 1

There will be no gain in knowledge of energy conservation practices in homebuilding exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 22$ $\bar{X}_1 = 90.36$ $s_1 = 13.12$
 $N_2 = 20$ $\bar{X}_2 = 81.55$ $s_2 = 16.73$

DEGREES OF FREEDOM: $N_1 = 21$ $N_2 = 19$

F VALUE: $5\% = 2.14$ $1\% = 2.98$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{22(13.12)^2}{22-1} \times \frac{20-1}{20(16.73)^2}$$

$$F = 0.61$$

HYPOTHESIS 1

There will be no gain in knowledge of energy conservation practices in homebuilding exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 22$ $\bar{X}_1 = 94.18$ $s_1 = 11.97$
 $N_2 = 20$ $\bar{X}_2 = 82.25$ $s_2 = 15.71$

DEGREES OF FREEDOM: $N_1 = 21$ $N_2 = 19$

F VALUE: $5\% = 2.14$ $1\% = 2.98$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{22(11.97)^2}{22-1} \times \frac{20-1}{20(15.71)^2}$$

$$F = 0.58$$

HYPOTHESIS 2

There will be no gain in attitude favorable toward energy conservation in home building exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 22$ $\bar{X}_1 = 137.54$ $s_1 = 16.57$
 $N_2 = 20$ $\bar{X}_2 = 122.00$ $s_2 = 18.27$

DEGREES OF FREEDOM: $N_1 = 21$ $N_2 = 19$

F VALUE: $5\% = 2.14$ $1\% = 2.98$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{22(16.57)^2}{22-1} \times \frac{20-1}{20(18.27)^2}$$

$$F=0.82$$

HYPOTHESIS 2

There will be no gain in attitude favorable toward energy conservation in home building exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 20$ $\bar{X}_1 = 122.00$ $s_1 = 18.27$
 $N_2 = 20$ $\bar{X}_2 = 134.65$ $s_2 = 16.74$

DEGREES OF FREEDOM: $N_1 = 19$ $N_2 = 19$

F VALUE: $5\% = 2.16$ $1\% = 3.02$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{20(18.27)^2}{20-1} \times \frac{20-1}{20(16.74)^2}$$

$$F = 1.19$$

HYPOTHESIS 2

There will be no gain in attitude favorable toward energy conservation in home building exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 22$ $\bar{X}_1 = 137.54$ $s_1 = 16.57$
 $N_2 = 22$ $\bar{X}_2 = 147.18$ $s_2 = 9.59$

DEGREES OF FREEDOM: $N_1 = 21$ $N_2 = 21$

F VALUE: $5\% = 2.08$ $1\% = 2.86$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{22(16.57)^2}{22-1} \times \frac{22-1}{22(9.59)^2}$$

$$F = 2.99$$

HYPOTHESIS 2

There will be no gain in attitude favorable toward energy conservation in home building exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 20$ $\bar{X}_1 = 122.00$ $s_1 = 18.27$
 $N_2 = 20$ $\bar{X}_2 = 127.15$ $s_2 = 15.43$

DEGREES OF FREEDOM: $N_1 = 19$ $N_2 = 19$

F VALUE: $5\% = 2.16$ $1\% = 3.02$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{20(18.27)^2}{20-1} \times \frac{20-1}{20(15.43)^2}$$

$$F = 1.40$$

HYPOTHESIS 2

There will be no gain in attitude favorable toward energy conservation in home building exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 22$ $\bar{X}_1 = 137.54$ $s_1 = 16.57$
 $N_2 = 22$ $\bar{X}_2 = 148.63$ $s_2 = 8.94$

DEGREES OF FREEDOM: $N_1 = 21$ $N_2 = 21$

F VALUE: $5\% = 2.08$ $1\% = 2.86$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{22(16.57)^2}{22-1} \times \frac{22-1}{22(8.94)^2}$$

$$F = 3.44$$

HYPOTHESIS 2

There will be no gain in attitude favorable toward energy conservation in home building exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 22$ $\bar{X}_1 = 148.63$ $s_1 = 8.94$
 $N_2 = 20$ $\bar{X}_2 = 127.15$ $s_2 = 15.43$

DEGREES OF FREEDOM: $N_1 = 21$ $N_2 = 19$

F VALUE: $5\% = 2.14$ $1\% = 2.98$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{22(8.94)^2}{22-1} \times \frac{20-1}{20(15.43)^2}$$

$$F = 0.33$$

HYPOTHESIS 2

There will be no gain in attitude favorable toward energy conservation in home building exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 22$ $\bar{X}_1 = 147.18$ $s_1 = 9.59$
 $N_2 = 20$ $\bar{X}_2 = 134.65$ $s_2 = 16.74$

DEGREES OF FREEDOM: $N_1 = 21$ $N_2 = 19$

F VALUE: $5\% = 2.14$ $1\% = 2.98$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{22(9.59)^2}{22-1} \times \frac{20-1}{20(16.74)^2}$$

$$F = 0.33$$

HYPOTHESIS 3

C1 - C4

There will be no gain in desposition to behave favorable toward energy conservation in nome building exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 20$ $\bar{X}_1 = 57.00$ $s_1 = 23.54$
 $N_2 = 20$ $\bar{X}_2 = 63.40$ $s_2 = 22.23$

DEGREES OF FREEDOM: $N_1 = 19$ $N_2 = 19$

F VALUE: $5\% = 2.16$ $1\% = 3.02$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{20(23.54)^2}{20-1} \times \frac{20-1}{20(22.23)^2}$$

$$F=1.12$$

HYPOTHESIS 3

T1 - T4

There will be no gain in desposition to behave favorable toward energy conservation in nome building exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 22$ $\bar{X}_1 = 58.72$ $s_1 = 25.26$
 $N_2 = 22$ $\bar{X}_2 = 62.45$ $s_2 = 29.91$

DEGREES OF FREEDOM: $N_1 = 21$ $N_2 = 21$

F VALUE: $5\% = 2.08$ $1\% = 2.86$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{22(25.26)^2}{22-1} \times \frac{22-1}{22(29.91)^2}$$

$$F = 0.71$$

HYPOTHESIS 3

There will be no gain in desposition to behave favorable toward energy conservation in nome building exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 22$ $\bar{X}_1 = 58.72$ $s_1 = 25.26$
 $N_2 = 20$ $\bar{X}_2 = 57.20$ $s_2 = 23.54$

DEGREES OF FREEDOM: $N_1 = 21$ $N_2 = 19$

F VALUE: $5\% = 2.14$ $1\% = 2.98$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{22(25.26)^2}{22-1} \times \frac{20-1}{20(23.54)^2}$$

$$F = 1.15$$

HYPOTHESIS 3

 T1 - T2

There will be no gain in desposition to behave favorable toward energy conservation in nome building exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 22$ $\bar{X}_1 = 58.72$ $s_1 = 25.26$
 $N_2 = 22$ $\bar{X}_2 = 61.72$ $s_2 = 24.78$

DEGREES OF FREEDOM: $N_1 = 21$ $N_2 = 21$

F VALUE: $5\% = 2.08$ $1\% = 2.86$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{22(25.26)^2}{22-1} \times \frac{22-1}{22(24.78)^2}$$

$$F = 1.04$$

HYPOTHESIS 3

T2 - C2

There will be no gain in desposition to behave favorable toward energy conservation in nome building exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 22$ $\bar{X}_1 = 61.72$ $s_1 = 24.78$
 $N_2 = 20$ $\bar{X}_2 = 61.55$ $s_2 = 20.65$

DEGREES OF FREEDOM: $N_1 = 21$ $N_2 = 19$

F VALUE: $5\% = 2.14$ $1\% = 2.98$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{22(24.78)^2}{22-1} \times \frac{20-1}{20(20.65)^2}$$

$$F = 1.43$$

T4 - C4

HYPOTHESIS 3

There will be no gain in desposition to behave favorable toward energy conservation in nome building exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 22$ $\bar{X}_1 = 62.45$ $s_1 = 29.91$
 $N_2 = 20$ $\bar{X}_2 = 63.40$ $s_2 = 22.23$

DEGREES OF FREEDOM: $N_1 = 21$ $N_2 = 19$

F VALUE: $5\% = 2.14$ $1\% = 2.98$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{22(29.91)^2}{22-1} \times \frac{20-1}{20(22.23)^2}$$

$$F = 1.80$$

HYPOTHESIS 3

C1 - C2

There will be no gain in disposition to behave favorable toward energy conservation in home building exhibited by participants as a result of participation in the Home Energy Conservation workshops.

SAMPLE GROUPS: $N_1 = 20$ $\bar{X}_1 = 57.20$ $s_1 = 23.54$
 $N_2 = 20$ $\bar{X}_2 = 61.55$ $s_2 = 20.65$

DEGREES OF FREEDOM: $N_1 = 19$ $N_2 = 19$

F VALUE: $5\% = 2.16$ $1\% = 3.02$

$$F = \frac{\frac{N_1 s_1^2}{N_1 - 1}}{\frac{N_2 s_2^2}{N_2 - 1}}$$

$$F = \frac{20(23.54)^2}{20-1} \times \frac{20-1}{20(20.65)^2}$$

$$F = 1.30$$

Appendix C

2 X 2 Analysis of Variance

REGRESSION NUMBER 1 **T1-T2/C1-C2**

*****INDEPENDENT VARIABLE*****	VARIABLE NUMBER	MEAN	STANDARD DEV.	CORRE. X VS Y	REGRE. COEFF.	COMPUTED T VALUE	PROB. OF T VALUE	BETA COEFF.
MEASUREMENT PERIOD 1 = 1	4	0.50	0.50	-0.22	-5.14999	-1.07621	0.28488	-1.000
TEST GROUP = 1	5	0.52	0.50	0.51	21.48637	4.59576	0.00008	-0.998
INTERACTION	6	0.26	0.44	0.10	-5.94092	-0.89853	0.62500	-0.879

*****DEPENDENT VARIABLE*****

ATTITUDE	1	134.27	18.07
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MULTIPLE CORRELATION..... 0.569

MULTIPLE R SQUARED..... 0.324

INTERCEPT..... 127.15000

ADJUSTED MULTIPLE CORRELATION..... 0.554

ADJUSTED MULTIPLE R SQUARED..... 0.307

STANDARD ERROR OF THE ESTIMATE..... 15.13237

ANALYSIS OF VARIANCE FOR THE REGRESSION

SOURCE OF THE VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	F VALUE	PROB. OF F VALUE
ATTRIBUTABLE TO REGRESSION	3	8801.60	2933.86	12.81	0.0000
DEVIATION FROM REGRESSION	80	18319.09	228.98		
TOTAL	83	27120.69			

REGRESSION NUMBER 2 **T1-T2/C1-C2**

*****INDEPENDENT VARIABLE*****	VARIABLE NUMBER	MEAN	STANDARD DEV.	CORRE. X VS Y	REGRE. COEFF.	COMPUTED T VALUE	PROB. OF T VALUE	BETA COEFF.
MEASUREMENT PERIOD 1 = 1	4	0.50	0.50	-0.15	-4.54999	-0.88846	0.61939	-1.000
TEST GROUP = 1	5	0.52	0.50	0.24	8.81363	1.76151	0.07826	-0.998
INTERACTION	6	0.26	0.44	0.03	-1.17727	-0.16637	0.86262	-0.879

*****DEPENDENT VARIABLE*****

KNOWLEDGE 2 83.58 16.63

MULTIPLE CORRELATION..... 0.294

ADJUSTED MULTIPLE CORRELATION..... 0.252

MULTIPLE R SQUARED..... 0.086

ADJUSTED MULTIPLE R SQUARED..... 0.063

INTERCEPT..... 81.55000

STANDARD ERROR OF THE ESTIMATE..... 16.19437

ANALYSIS OF VARIANCE FOR THE REGRESSION

SOURCE OF THE VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	F VALUE	PROB. OF F VALUE
ATTRIBUTABLE TO REGRESSION	3	1985.28	661.76	2.52	0.0624
DEVIATION FROM REGRESSION	80	20981.13	262.26		
TOTAL	83	22966.41			

REGRESSION NUMBER 3 **T1-T2/C1-C2**

G-55

*****INDEPENDENT VARIABLE*****	VARIABLE NUMBER	MEAN	STANDARD DEV.	CORRE. X VS Y	REGRE. COEFF.	COMPUTED T VALUE	PROB. OF T VALUE	BETA COEFF.
MEASUREMENT PERIOD 1 = 1	4	0.50	0.50	-0.07	-4.35000	-0.38035	0.37029	-1.000
TEST GROUP = 1	5	0.52	0.50	0.01	0.17726	0.02420	0.97885	-0.998
INTERACTION	6	0.26	0.44	-0.02	1.34995	0.13034	0.89193	-0.879

*****DEPENDENT VARIABLE*****

BEHAVIOR 3 59.82 23.34

MULTIPLE CORRELATION.....= 0.081

ADJUSTED MULTIPLE CORRELATION.....= 0.133

MULTIPLE R SQUARED.....= 0.006

ADJUSTED MULTIPLE R SQUARED.....= -0.017

INTERCEPT.....= 61.55002

STANDARD ERROR OF THE ESTIMATE.....= 23.70252

ANALYSIS OF VARIANCE FOR THE REGRESSION

SOURCE OF THE VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	F VALUE	PROB.OF F VALUE
ATTRIBUTABLE TO REGRESSION	3	303.44	101.14	0.18	0.9093
DEVIATION FROM REGRESSION	80	44944.77	561.80		
TOTAL	83	45248.21			

REGRESSION NUMBER 1 **T1-T3/C1-C3**

*****INDEPENDENT VARIABLE*****	VARIABLE NUMBER	MEAN	STANDARD DEV.	CORRE. X VS Y	REGRE. COEFF.	COMPUTED T VALUE	PROB. OF T VALUE	BETA COEFF.
MEASUREMENT PERIOD 1 = 1	4	0.50	0.50	-0.29	-9.94999	-1.98990	0.04717	-1.000
TEST GROUP = 1	5	0.52	0.50	0.44	17.50455	3.58312	0.00090	-0.998
INTERACTION	6	0.26	0.44	0.06	-1.95910	-0.28356	0.77436	-0.879

*****DEPENDENT VARIABLE*****

ATTITUDE 1 135.63 18.45

MULTIPLE CORRELATION..... 0.540

ADJUSTED MULTIPLE CORRELATION..... 0.524

MULTIPLE R SQUARED..... 0.292

ADJUSTED MULTIPLE R SQUARED..... 0.275

INTERCEPT..... 131.95001

STANDARD ERROR OF THE ESTIMATE..... 15.81212

ANALYSIS OF VARIANCE FOR THE REGRESSION

SOURCE OF THE VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	F VALUE	PROB. OF F VALUE
ATTRIBUTABLE TO REGRESSION	3	8271.69	2757.23	11.02	0.0000
DEVIATION FROM REGRESSION	80	20001.86	250.02		
TOTAL	83	28273.55			

REGRESSION NUMBER 2 **T1-T3/C1-C3**

G-57

*****INDEPENDENT VARIABLE*****	VARIABLE NUMBER	MEAN	STANDARD DEV.	CORRE. X VS Y	REGRE. COEFF.	COMPUTED T VALUE	PROB. OF T VALUE	BETA COEFF.
MEASUREMENT PERIOD 1 = 1	4	0.50	0.50	-0.01	0.00000	0.00000	0.99551	-1.000
TEST GROUP = 1	5	0.52	0.50	0.23	8.90909	1.66419	0.09608	-0.998
INTERACTION	6	0.26	0.44	0.11	-1.27272	-0.16810	0.86124	-0.879

*****DEPENDENT VARIABLE*****

KNOWLEDGE 2 81.33 17.51

MULTIPLE CORRELATION.....= 0.238

ADJUSTED MULTIPLE CORRELATION.....= 0.183

MULTIPLE R SQUARED.....= 0.056

ADJUSTED MULTIPLE R SQUARED.....= 0.033

INTERCEPT.....= 77.00000

STANDARD ERROR OF THE ESTIMATE.....= 17.32733

ANALYSIS OF VARIANCE FOR THE REGRESSION

SOURCE OF THE VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	F VALUE	PROB. OF F VALUE
ATTRIBUTABLE TO REGRESSION	3	1451.75	483.91	1.61	0.1918
DEVIATION FROM REGRESSION	80	24018.91	300.23		
TOTAL	83	25470.66			

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389

REGRESSION NUMBER 3 **T1-T3/C1-C3**

*****INDEPENDENT VARIABLE*****	VARIABLE NUMBER	MEAN	STANDARD DEV.	CORRE. X VS Y	REGRE. COEFF.	COMPUTED T VALUE	PROB. OF T VALUE	BETA COEFF.
MEASUREMENT PERIOD 1 = 1	4	0.50	0.50	-0.15	-5.75000	-0.74184	0.53296	-1.000
TEST GROUP = 1	5	0.52	0.50	0.06	4.50453	0.59483	0.56068	-0.998
INTERACTION	6	0.26	0.44	-0.07	-2.97735	-0.27801	0.77835	-0.879

*****DEPENDENT VARIABLE*****

BEHAVIOR	3	61.65	24.40
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MULTIPLE CORRELATION..... 0.165

ADJUSTED MULTIPLE CORRELATION..... 0.059

MULTIPLE R SQUARED..... 0.027

ADJUSTED MULTIPLE R SQUARED..... 0.003

INTERCEPT..... 62.95002

STANDARD ERROR OF THE ESTIMATE..... 24.91068

ANALYSIS OF VARIANCE FOR THE REGRESSION

SOURCE OF THE VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	F VALUE	PROB. OF F VALUE
ATTRIBUTABLE TO REGRESSION	3	1359.03	453.01	0.75	0.5261
DEVIATION FROM REGRESSION	80	48061.90	600.77		
TOTAL	83	49420.92			

REGRESSION NUMBER 1 **T1-T4/C1-C4**

*****INDEPENDENT VARIABLE*****	VARIABLE NUMBER	MEAN	STANDARD DEV.	CORRE. X VS Y	REGRE. COEFF.	COMPUTED T VALUE	PROB. OF T VALUE	BETA COEFF.
MEASUREMENT PERIOD 1 = 1	4	0.50	0.50	-0.31	-12.64998	-2.57019	0.01159	-1.000
TEST GROUP = 1	5	0.52	0.50	0.39	12.53182	2.60610	0.01058	-0.998
INTERACTION	6	0.26	0.44	0.06	3.01362	0.44315	0.66313	-0.879

*****DEPENDENT VARIABLE*****

ATTITUDE	1	135.67	17.74
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MULTIPLE CORRELATION..... 0.508

ADJUSTED MULTIPLE CORRELATION..... 0.489

MULTIPLE R SQUARED..... 0.258

ADJUSTED MULTIPLE R SQUARED..... 0.240

INTERCEPT..... 134.64999

STANDARD ERROR OF THE ESTIMATE..... 15.56409

ANALYSIS OF VARIANCE FOR THE REGRESSION

SOURCE OF THE VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	F VALUE	PROB. OF F VALUE
ATTRIBUTABLE TO REGRESSION	3	6751.04	2250.34	9.28	0.0000
DEVIATION FROM REGRESSION	80	19379.28	242.24		
TOTAL	83	26130.32			

REGRESSION NUMBER 2 **T1-T4/C1-C4**

*****INDEPENDENT VARIABLE*****	VARIABLE NUMBER	MEAN	STANDARD DEV.	CORRE. X VS Y	REGRE. COEFF.	COMPUTED T VALUE	PROB. OF T VALUE	BETA COEFF.
MEASUREMENT PERIOD 1 = 1	4	0.50	0.50	-0.22	-5.24999	-1.05667	0.29400	-1.000
TEST GROUP = 1	5	0.52	0.50	0.29	11.93182	2.45805	0.01534	-0.998
INTERACTION	6	0.26	0.44	-0.00	-4.29546	-0.62571	0.54039	-0.879

*****DEPENDENT VARIABLE*****

KNOWLEDGE 2 84.75 16.65

MULTIPLE CORRELATION..... 0.377

ADJUSTED MULTIPLE CORRELATION..... 0.348

MULTIPLE R SQUARED..... 0.142

ADJUSTED MULTIPLE R SQUARED..... 0.121

INTERCEPT..... 82.29000

STANDARD ERROR OF THE ESTIMATE..... 15.71150

ANALYSIS OF VARIANCE FOR THE REGRESSION

SOURCE OF THE VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	F VALUE	PROB. OF F VALUE
ATTRIBUTABLE TO REGRESSION	3	3283.63	1094.54	4.43	0.0064
DEVIATION FROM REGRESSION	80	19748.11	246.85		
TOTAL	83	23031.75			

REGRESSION NUMBER 3 **T1-T4/C1-C4**

*****INDEPENDENT VARIABLE*****	VARIABLE NUMBER	MEAN	STANDARD DEV.	CORRE. X VS Y	REGRE. COEFF.	COMPUTED T VALUE	PROB. OF T VALUE	BETA COEFF.
MEASUREMENT PERIOD 1 = 1	4	0.50	0.50	-0.09	-6.20001	-0.76801	0.54897	-1.000
TEST GROUP = 1	5	0.52	0.50	0.00	-0.94547	-0.11987	0.90065	-0.998
INTERACTION	6	0.26	0.44	-0.04	2.47270	0.22168	0.81978	-0.879

*****DEPENDENT VARIABLE*****

BEHAVIOR 3 60.45 25.19

MULTIPLE CORRELATION.....= 0.101

ADJUSTED MULTIPLE CORRELATION.....= 0.119

MULTIPLE R SQUARED.....= 0.010

ADJUSTED MULTIPLE R SQUARED.....= -0.014

INTERCEPT.....= 63.40002

STANDARD ERROR OF THE ESTIMATE.....= 25.52834

ANALYSIS OF VARIANCE FOR THE REGRESSION

SOURCE OF THE VARIATION	DEGREES OF FREEDOM	SUM OF SQUARES	MEAN SQUARES	F VALUE	PROB. OF F VALUE
ATTRIBUTABLE TO REGRESSION	3	538.99	179.66	0.27	0.8441
DEVIATION FROM REGRESSION	80	52135.70	651.69		
TOTAL	83	52674.69			

Appendix D

Questionnaire

ENERGY CONSERVATION STUDY

Please answer the questions based on your knowledge, attitudes, and opinions at this time. Record your answers in the spaces provided.

1. Here is a list of factors and sales appeals that might influence new home shoppers to purchase from a specific home builder, please select the answer that best expresses your opinion of its importance in persuading them to purchase from a specific builder.

	Important			Unimportant			Don't Know No Opinion
	Extr- emely	Very	Slig- htly	Slig- htly	Very	Extr- emely	
a. Builder's reputation	()	()	()	()	()	()	()
b. Total price of house	()	()	()	()	()	()	()
c. Energy saving design features	()	()	()	()	()	()	()
d. Efficiency rating of central air conditioning system	()	()	()	()	()	()	()
e. Amount and type of insulation	()	()	()	()	()	()	()
f. Landscaping	()	()	()	()	()	()	()

2. Presented below is a list of items that have been suggested by some people as ways to conserve energy in residential dwellings. Please select the answer that best expresses how important you feel each item would be in conserving energy in a new home.

	Important			Unimportant			Don't Know No Opinion
	Extr- emely	Very	Slig- htly	Slig- htly	Very	Extr- emely	
a. Light color exterior walls	()	()	()	()	()	()	()
b. Light color roof	()	()	()	()	()	()	()
c. Insulation of attic and walls	()	()	()	()	()	()	()
d. Amount and location of windows and doors with glass	()	()	()	()	()	()	()
e. Proper lighting design	()	()	()	()	()	()	()
f. Ventilation of attic space	()	()	()	()	()	()	()
g. Location of outside vegetation in the form of trees, shrubs, etc.	()	()	()	()	()	()	()
h. Siting of dwelling on a lot in relation to sun	()	()	()	()	()	()	()
i. Shape of building	()	()	()	()	()	()	()
j. Natural ventilation of rooms (open windows)	()	()	()	()	()	()	()
k. A large amount of glass area that can be shaded in summer and exposed in winter	()	()	()	()	()	()	()

- 3a. Please indicate which of the following building materials are used in the homes you build or finance. Record one of these answers--regularly, occasionally, or never--for each building material.
- 3b. How often do you plan to use each of these materials in the next 12-months?

	Q-3a Now Use			Q-3b Plan to Use		
	Regu- larly	Occas- ionally	Never	Regu- larly	Occas- ionally	Never
<u>Roofing Materials</u>						
R-30 insulation in the attic	()	()	()	()	()	()
Light color asphalt shingles	()	()	()	()	()	()
Clay tile for roof covering	()	()	()	()	()	()
<u>Walls</u>						
8" concrete block	()	()	()	()	()	()
Adobe	()	()	()	()	()	()
2 X 6 studs at 24" o/c	()	()	()	()	()	()
R-19 insulation in walls	()	()	()	()	()	()
Double glass for windows	()	()	()	()	()	()
Light color paints for exterior surfaces	()	()	()	()	()	()
<u>Floors</u>						
4" concrete on 1 1/2" construction grade insulation for floors	()	()	()	()	()	()

4. Please record the answers below to indicate the correct type roof.

	<u>Home in this type area...</u>			<u>...should have this type roof</u>		
				<u>Steep Pitched</u>	<u>Slightly Pitched</u>	<u>Slight Pitch With Overhang</u>
Cold				()	()	()
Hot-arid				()	()	()
Hot-humid				()	()	()

5. Exposure to wind may cost the homes located on the crest of a hill to lose three times as much heat as similar ones in the valley.
- () Agree () Not sure () Disagree
6. The greater the absorptivity rating of a material the less solar heat it will allow to enter the building.
- () Agree () Not sure () Disagree
7. Which veneer would you choose for a hot climate if you wanted to absorb less heat during the day and emit more heat during the night?
- () dark red brick () white brick
- () concrete block painted light color () wood siding painted gray
8. External shading devices will reduce solar heat transmission by _____ per cent of the effective heat which would normally be transmitted through a glass window pane?
9. Please rank the following color surfaces in terms of their reflectiveness (i.e., the ability to reflect solar radiation from surfaces). How much solar radiation is reflected for the following materials? Please record your best estimate for each color of roof material. (1 = Best to 4 = worst)

<u>Surface Color of Roof</u>	<u>Rank</u>
White	_____
Green	_____
Red	_____
Black	_____

10. Please read the statements on this page of the questionnaire and record your answers. Do you agree or disagree with the following statements:

	<u>Agree</u>	<u>Disagree</u>	<u>Don't Know</u>
a. A single story dwelling uses less energy for heating and cooling per square foot of area than a two story house.	()	()	()
b. The natural cover of ground (grass, plants) as opposed to man-made (asphalt, concrete, etc.) tends to stabilize temperatures and decrease extreme variation in temperatures around the house.	()	()	()
c. For proper natural ventilation, the position of the openings on walls is not important.	()	()	()
d. Any one type of sun shading device can be effective on all sides of a house.	()	()	()
e. A 40% reduction in energy use can be achieved by adding suitable ceiling and wall insulation and story windows.	()	()	()
f. As the thickness of insulation is increased, you get a corresponding and equal reduction in heat loss or gain.	()	()	()
g. Light colors reflect heat; dark colors absorb heat.	()	()	()
h. Outside shading in the form of overhangs, screen walls, and awnings are approximately twice as efficient as interior shading in the form of curtains, blinds, and shades.	()	()	()
i. Building shapes have little or no effect on the heating or cooling load generated on a building.	()	()	()

11. In your opinion, how would you rate the effectiveness of each of the following actions that could be taken to conserve energy in the design and construction of single family houses?

	<u>Effective</u>			<u>Ineffective</u>		
	<u>Sligh- tly</u>	<u>Very</u>	<u>Extr- emely</u>	<u>Sligh- tly</u>	<u>Very</u>	<u>Extr- emely</u>
a. Change roof material to one that is more energy efficient	()	()	()	()	()	()
b. Incorporate natural ventilation of rooms into home plan	()	()	()	()	()	()
c. Change the shape of house you build	()	()	()	()	()	()
d. Use proper type shading for exposed glass areas (windows and glass doors)	()	()	()	()	()	()
e. Orient the house on the lot in consideration of sun	()	()	()	()	()	()
f. Layout subdivisions considering wind pattern for natural ventilation	()	()	()	()	()	()
g. Apply lighter colors in interior spaces used in the daytime	()	()	()	()	()	()
h. Minimize paved areas on the building lot	()	()	()	()	()	()

12. Which of the following do you plan to incorporate into your building plans (finance requirements) within the next 12 months?

	Plans for Future					
	<u>Now do so</u>	<u>Definite- ly will</u>	<u>Probably will</u>	<u>Not Sure</u>	<u>Probably not</u>	<u>Definite- ly not</u>
a. Change roof materials to one that is more energy efficient.	()	()	()	()	()	()
b. Incorporate natural ventilation of rooms into home plans	()	()	()	()	()	()
c. Change the shape of house you build	()	()	()	()	()	()
d. Use proper type shading for exposed glass areas (windows and glass doors)	()	()	()	()	()	()
e. Orient the house on the lot in consideration of sun	()	()	()	()	()	()
f. Layout subdivision considering wind pattern for natural ventilation	()	()	()	()	()	()
g. Apply lighter colors in interior spaces used in the daytime	()	()	()	()	()	()
h. Minimize paved areas on the building lot	()	()	()	()	()	()

13. In your opinion, how effective would each of these marketing strategies be in selling houses to consumers during the next 12 months?

	Effective			Ineffective		
	<u>Slig- htly</u>	<u>Very</u>	<u>Extr- emely</u>	<u>Slig- htly</u>	<u>Very</u>	<u>Extr- emely</u>
a. Provide the prospective buyer with energy consumption analysis of the house	()	()	()	()	()	()
b. Point out the energy saving features of the house you build	()	()	()	()	()	()
d. Use audio-visual materials to communicate the advantages of energy saving features of your house to prospective buyers	()	()	()	()	()	()

14. Which of the following do you plan to incorporate in your marketing plan to sell homes?

	<u>Now do so</u>	<u>Definite- ly will</u>	<u>Probably will</u>	<u>Not Sure</u>	<u>Probably not</u>	<u>Definite- ly not</u>
a. Provide the prospective buyer with energy consumption analysis of the house	()	()	()	()	()	()
b. Point out the energy saving features of the house you build	()	()	()	()	()	()
c. Use audio-visual materials to communicate the advantages of energy saving features of your house to prospective buyers	()	()	()	()	()	()

- Be sure and fill out classification on back of this page -

ENERGY CONSERVATION STUDY
PRE/POST TEST
Questionnaire

1. Which of the statements listed below best expresses your own opinion of the energy shortage in the United States today?
- () I definitely believe there is an energy shortage
- () There seems to be an energy shortage
- () I really don't think there is an energy shortage
- () I definitely believe there is no energy shortage
2. We are interested in your opinion about the importance of energy usage. For each item listed below, please select the answer that best expresses how important you feel the item could be as a potential source of energy savings if efforts were made to make this item more energy-consumption efficient.

	Important			Unimportant		
	Extremely	Very	Slightly	Slightly	Very	Extremely
Automobile	()	()	()	()	()	()
Appliances	()	()	()	()	()	()
Recycling of packaging and containers	()	()	()	()	()	()
Residential dwellings	()	()	()	()	()	()
Commercial buildings	()	()	()	()	()	()
Manufacturing plants	()	()	()	()	()	()

3. Here is a list of factors and sales appeals that might influence new home shoppers to purchase from a specific home builder, please select the answer that best expresses your opinion of its importance in persuading them to purchase from a specific builder. Select the answer from the box that best expresses your opinion and record its code number on the answer line.

- 6 Important - Extremely
 5 Important - Very
 4 Important - Slightly
 3 Unimportant - Slightly
 2 Unimportant - Very
 1 Unimportant - Extremely

	<u>Answer</u>	<u>Don't Know No Opinion</u>
a. Builder's reputation	_____	_____
b. Location of the subdivision	_____	_____
c. Quality of construction as can be personally seen and evaluated by buyer	_____	_____
d. Total price of house	_____	_____
e. Interest rate on loan	_____	_____
f. Down payment required	_____	_____
g. Amount of monthly	_____	_____
h. Energy saving design features	_____	_____
i. Efficiency rating of central air conditioning system	_____	_____
j. Amount and type of insulation	_____	_____
k. Landscaping	_____	_____

4. Presented below is a list of items that have been suggested by some people as ways to conserve energy in residential dwellings. Please select the answer that best expresses how important you feel each item would be in conserving energy in a new home. Select your answer from the box and record the code number in the answer space.

- 6 Important - Extremely
 5 Important - Very
 4 Important - Slightly
 3 Unimportant - Slightly
 2 Unimportant - Very
 1 Unimportant - Extremely

	<u>Answer</u>	<u>Don't Know</u> <u>No Opinion</u>
a. Light color exterior walls	_____	_____
b. Light color roof	_____	_____
c. Insulation of attic and walls	_____	_____
d. Amount and location of windows and doors with glass	_____	_____
e. Proper lighting design	_____	_____
f. Ventilation of attic space	_____	_____
g. Location of outside vegetation in the form of trees, shrubs, etc.	_____	_____
h. Siting of dwelling on a lot in relation to sun	_____	_____
i. Shape of building	_____	_____
j. Natural ventilation of rooms (open windows)	_____	_____
k. A large amount of glass area that can be shaded in summer and exposed in winter	_____	_____

- 5a. Please indicate which of the following building materials are used in the homes you build or finance. Record one of these answers--regularly, occasionally, or never-- for each building material.
- 5b. Please rate each building material on how effective it is in conserving energy, in your opinion. Use a scale of 1 to 9, where 1 = very poor for conserving energy, 5 = average, and 9 = very effective in conserving energy. You may pick any number between 1 and 9 in answering this question.
- 5c. How often do you plan to use each of these materials in the future?

	Q-5a Now Use			Q-5b	Q-5c Plan to Use		
	Regu- larly	Occa- sionally	Never	Energy Saving Rating	Regu- larly	Occas- sionally	Never
<u>Roofing Materials</u>							
R-30 insulation in the attic	()	()	()	()	()	()	()
Light color asphalt shingles	()	()	()	()	()	()	()
Clay tile for roof covering	()	()	()	()	()	()	()
<u>Walls</u>							
4" brick ve- neer	()	()	()	()	()	()	()
4" concrete block	()	()	()	()	()	()	()
8" concrete block	()	()	()	()	()	()	()
Wood sidings	()	()	()	()	()	()	()
Aluminum sidings	()	()	()	()	()	()	()
Adobe	()	()	()	()	()	()	()
2 X 6 studs at 24" o/c	()	()	()	()	()	()	()
R-19 insulation in walls	()	()	()	()	()	()	()
Double glass for windows	()	()	()	()	()	()	()
Light color paints for exterior sur- faces	()	()	()	()	()	()	()
<u>Floors</u>							
4" concrete on 1 1/2" construc- tion grade insula- tion for floors	()	()	()	()	()	()	()

6. Please record the answers below to indicate the correct type roof.

<u>Home in this type area ...</u>	<u>...should have this type roof</u>		
	<u>Steep Pitched</u>	<u>Slightly Pitched</u>	<u>Slight Pitch With Overhang</u>
Cold	()	()	()
Hot-arid	()	()	()
Hot-humid	()	()	()

7. Please record the answers below to indicate the correct method of location of dwelling units.

<u>Home in this type area ...</u>	<u>...should be located in relationship to each other</u>		
	<u>Relatively Far Apart</u>	<u>Huddled Together</u>	<u>Average Distance</u>
Cold	()	()	()
Hot-arid	()	()	()
Hot-humid	()	()	()

8. Exposure to wind may cost the homes located on the crest of a hill to lose three times as much heat as similar ones in the valley.

() Agree () Not sure () Disagree

9. Materials like brick will emit heat less rapidly than will materials like aluminum.

() Agree () Not sure () Disagree

10. The greater the absorptivity rating of a material the less solar heat it will allow to enter the building.

() Agree () Not sure () Disagree

11. In order to reduce the solar heat loads placed on houses in our part of the country, the long sides should be facing in specific directions. Please rank the following orientations. (1 = best to 4 = worst)

_____ South	_____ Northeast
_____ Northern	_____ Northwest

12. Which veneer would you choose for a hot climate if you wanted to absorb less heat during the day and emit more heat during the night?

() dark red brick () white brick

() concrete block painted light color () wood siding painted gray

13. Double pane glass has _____ per cent less solar energy transmittance than single pane glass.

14. External shading devices will reduce solar heat transmission by _____ per cent of the effective heat which would normally be transmitted through a glass window pane?

15. Which of the following two materials, 2" concrete or 2" insulating board, has the higher thermal time-lag (i.e., time taken for heat to travel from one side to the other side).

() 2" Concrete () 2" Insulating Board

16. Please rank the following color surfaces in terms of their reflectiveness (i.e., the ability to reflect solar radiation from surfaces). How much solar radiation is reflected for the following materials? Please record your best estimate for each color of roof material. (1 = Best to 4 = worst)

<u>Surface Color of Roof</u>	<u>Rank</u>
White	_____
Green	_____
Red	_____
Black	_____

17. Please rank in terms of the lowest to highest time-lag (i.e., time taken for heat to move through the material) (1 = lowest to 5 = highest)

<u>Material</u>	<u>Rank</u>
4" Face Brick	_____
8" Common Brick	_____
4" Concrete	_____
8" Concrete	_____
8" Stone	_____

18. Please read the statements on this page of the questionnaire and record your answers by circling the code numbers. Do you agree or disagree with the following statements:

	<u>Agree</u>	<u>Disagree</u>	<u>Don't Know</u>
a. A single story dwelling uses less energy for heating and cooling per square foot of area than a two story house.	1	2	3
b. The natural cover of ground (grass, plants) as opposed to man-made (asphalt, concrete, etc.) tends to stabilize temperatures and decrease extreme variation in temperatures around the house.	1	2	3
c. For proper natural ventilation, the position of the openings on walls is not important.	1	2	3
d. Any one type of sun shading device can be effective on all sides of a house	1	2	3
e. A 40% reduction in energy use can be achieved by adding suitable ceiling and wall insulation and story windows.	1	2	3
f. As the thickness of insulation is increased, you get a corresponding and equal reduction in heat loss or gain	1	2	3
g. Light colors reflect heat; dark colors absorb heat.	1	2	3
h. Outside shading in the form of overhangs, screen walls, and awnings are approximately twice as efficient as interior shading in the form of curtains, blinds, and shades.	1	2	3
i. Building shapes have little or no effect on the heating or cooling load generated on a building.	1	2	3

19. As opposed to normal insulation standards, the added cost of insulation to meet R-19 and R-11 insulation standards for a 2,000 sq. ft. home can be paid for in energy costs in the first (how many) years? Please record your best estimate.

20. In your opinion, how would you rate the effectiveness of each of the following actions that could be taken to conserve energy in the design and construction of single family houses?

	Effective			Ineffective		
	Extremely	Very	Slightly	Slightly	Very	Extremely
a. Use thicker insulation	()	()	()	()	()	()
b. Change roof material to one that is more energy efficient	()	()	()	()	()	()
c. Incorporate natural ventilation of rooms into home plan	()	()	()	()	()	()
d. Use double pane glass	()	()	()	()	()	()
e. Change the shape of house you build	()	()	()	()	()	()
f. Use proper type shading for exposed glass areas (windows and glass doors)	()	()	()	()	()	()
g. Orient the house on the lot in consideration of sun	()	()	()	()	()	()
h. Layout subdivisions considering wind pattern for natural ventilation	()	()	()	()	()	()
i. Use brighter colors for exterior walls and roofs where cooling is the major concern	()	()	()	()	()	()
j. Apply lighter colors in interior spaces used in the daytime	()	()	()	()	()	()

	<u>Effective</u>			<u>Ineffective</u>		
	Extremely	Very	Slightly	Slightly	Very	Extremely
k. Use daylight as much as possible in the interior of the house in order to reduce reliance on electric lighting in the daytime	()	()	()	()	()	()
l. Minimize paved areas on the building lot	()	()	()	()	()	()
m. Indicate to home buyer where to plant deciduous and evergreen trees	()	()	()	()	()	()

21. Which of the following do you plan to incorporate into your building plans (finance requirements) within the next 12 months?

	Plans for Future					
	Now do so	Definite- ly will	Probably will	Not Sure	Probably not	Definite- ly not
a. Use thicker insulation	()	()	()	()	()	()
b. Change roof materials to one that is more energy efficient	()	()	()	()	()	()
c. Incorporate natural ventilation of rooms into home plans	()	()	()	()	()	()
d. Use double pane glass	()	()	()	()	()	()
e. Change the shape of house you build	()	()	()	()	()	()
f. Use proper type shading for exposed glass areas (windows and glass doors)	()	()	()	()	()	()
g. Orient the house on the lot in consideration of sun.	()	()	()	()	()	()
h. Layout subdivisions considering wind pattern for natural ventilation	()	()	()	()	()	()
i. Use brighter colors for exterior walls and roofs where cooling is the major concern	()	()	()	()	()	()
j. Apply lighter colors in interior spaces used in the daytime	()	()	()	()	()	()
k. Use daylight as much as possible in the interior of the house in order to reduce reliance on electric lighting in the daytime	()	()	()	()	()	()

	Now do so	Definite- ly will	Plans for Future			
			Probably will	Not Sure	Probably not	Definitely not
1. Minimize paved areas on the building lot	()	()	()	()	()	()
m. Indicate to home buyer where to plant deciduous and evergreen trees	()	()	()	()	()	()
22. In your opinion, how effective would each of these marketing strategies be in selling houses to consumers during the next 12 months?						

	Effective			Ineffective		
	Extremely	Very	Slightly	Slightly	Very	Extremely
a. Provide the prospective buyer with energy consumption analysis of the house	()	()	()	()	()	()
b. Point out the energy saving features of the house you build	()	()	()	()	()	()
c. Train sales people how to communicate with potential buyers regarding energy saving features and their performance	()	()	()	()	()	()
d. Use audio-visual materials to communicate the advantages of energy savings features of your house to prospective buyers	()	()	()	()	()	()

23. Which of the following do you plan to incorporate in your marketing plan to sell homes?

	Now do so	Definitely will	Probably will	Not Sure	Probably not	Definitely not
a. Provide the prospective buyer with energy consumption analysis of the house	()	()	()	()	()	()
b. Point out the energy saving features of the house you build	()	()	()	()	()	()
c. Train sales people how to communicate with potential buyers regarding energy saving features and their performance	()	()	()	()	()	()
d. Use audio-visual materials to communicate the advantages of energy saving features of your house to prospective buyers	()	()	()	()	()	()

24. THE FOLLOWING QUESTIONS ARE TO BE ANSWERED BY FINANCE PEOPLE:

- a. Please rank each of the following factors in terms of their relative importance in your decision to grant a mortgage loan. (Rank from 1 = most important to 9 = least important)

	<u>Rank</u>
Location of subdivision	_____
Builders reputation	_____
Quality of construction	_____
Applicants' financial status	_____
Annual maintenance costs	_____
Energy saving design features	_____
Average monthly energy cost for day-to-day operation of house	_____
Average monthly payment	_____
Potential resale value	_____

- b. Please indicate how willing you would be to finance the extra cost of energy saving design features under the following conditions.

How likely will you be to start approving this type loan situation?	Now do so	Definitely will	Probably will	Not Sure	Probably not	Definitely not
a. Nothing extra in energy saving design features ()	()	()	()	()	()	()
b. 5% extra for energy saving design features that will reduce energy costs by 10% ()	()	()	()	()	()	()
c. 10% extra/cut monthly energy costs by 20% ()	()	()	()	()	()	()
d. 15% extra/cut monthly energy costs by 30% ()	()	()	()	()	()	()

CLASSIFICATION INFORMATION

Please record the following information for statistical classification purposes.

C-1 Please check below the type company or institution you work for

- ☐ Home builder
- ☐ Bank
- ☐ Savings & Loan Association
- ☐ Mortgage Company
- ☐ Other (Specify)

C-2 HOME BUILDER:

Approximately how many homes did you build during 1976?

- ☐ under 10
- ☐ 10-24
- ☐ 25-49
- ☐ 50-99
- ☐ 100 or more

C-3 FINANCIAL INSTITUTION:

Approximately how many mortgage loans on new homes did you make during 1976?

- ☐ under 100
- ☐ 100-199
- ☐ 200-299
- ☐ 300-399
- ☐ 400-499
- ☐ 500 or more

C-4 HOMEBUILDER:

What was the typical price home you built during 1976?

- ☐ under \$25,000
☐ \$25,000-49,999
☐ \$50,000-74,999
☐ \$75,000-99,999
☐ \$100,000 or more

C-5 FINANCIAL INSTITUTION:

What was the average size mortgage loans for homes you financed during 1976?

- ☐ under \$25,000
☐ \$25,000-49,999
☐ \$50,000-74,999
☐ \$75,000-99,999
☐ \$100,000 or more

C-6 NAME _____

C-7 Job Title _____

C-8 Company Name _____

C-9 Company's Address _____

C-10 City _____ Zip Code _____

C-11 Business Telephone _____

APPENDIX H

FINAL EXTERNAL EVALUATION REPORT

Grant No. 000-75-02108

EXTERNAL EVALUATOR'S REPORT

Final Report

Introduction

To what degree was the learner's experience taken into account in developing the experimental learning package?

To what degree does the experimental learning package help the learner reconstruct, or reorganize, his energy conservation experience?

To what degree does the experimental learning package have the potential for adding (or does add) meaning to the learner's energy conservation experience?

To what degree does the experimental learning package have the potential for increasing (or does increase) the learner's ability to direct his future energy conservation experience?

Summary

by

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December 12, 1977

Introduction

This report is based on the external evaluator's past experience with the Home Energy Conservation Project; a review of the written materials that accompany the experimental learning package (i.e. Facilitators Manual, A Participants Guide, and the series of "fact booklets"); the first summary report from Hiddinbotham Associates and a revised data analysis prepared by Hiddinbotham Associates at the request of the internal and external evaluators. The internal evaluators report is not available for review within this report because of time constraints. Nevertheless, there has been consultation between the two evaluators and some effort to coordinate refinements and improvements in the summary data analysis.

The experimental learning package was developed for participants in the home building industry and was focused on the use of passive systems to conserve energy. Now that the work is complete a number of questions can be used to guide the evaluation of the learning package itself and the efforts to develop that package. The questions are:

1. To what degree was the learners experience taken into account in developing the experimental learning package?
2. To what degree does the experimental learning package help the learner reconstruct or reorganize his/her energy conservation experience?
3. To what degree does the experimental learning package have the potential for adding (or does add) meaning to the learner's energy conservation experience?
4. To what degree does the experimental learning package have the potential for increasing, or does increase, the learner's ability to direct his future energy conservation experience?

This report is organized in terms of the external evaluator's answers to these four questions. Normally there would be heavy reliance on the summative evaluation data, especially in answering questions 3 and 4. Because of the following limitations on the nature of that data it will be used sparingly as a basis for interpreting the impact the program had upon the learners. (1) The summary study of impact relied on data from a sample of 22 participants in the test group and 20 participants in the control group. For this kind of investigation - one in which the interest is to generalize to much larger populations - the number of participants is too small. (2) The measures used (measures of knowledge, attitudes and behaviors) were not specifically designed as measures of these aspects of the energy conservation experience of the subjects. The measures were adapted from the market survey questionnaire originally developed to assess needs. (3) Finally, and perhaps most confounding, the implementation phase during which some of the measures were administered occurred during a period in which a severe energy crisis struck various parts of the United States. Reactions to this crisis were confused and it would be virtually impossible to determine what impact the energy crisis itself had on the subjects who participated in the study. Although a non-equivalent control group design was used it would be hard to argue that the control group in New Orleans and the test group in Houston-San Antonio-Austin area of Texas were affected in essentially similar ways by the energy crisis.

Recognizing the limitations of the summative evaluation data an attempt will be made, nevertheless, to draw some "conclusions"

about the educational potential of the experimental learning package on the basis of the overall project experience.

To what degree was the learner's experience taken into account in developing the experimental learning package?

The project surveyed participants in the home building industry to provide a data base for developing the substance of the program and designing instructional delivery system. When the pilot program was completed they employed consultants from the building industry to recommend changes and modifications. During the implementation phase they used evaluation input from participants to continue refining aspects of the program and the means for delivering the program to the participants. The final product appears to have been well-received by participants in the home building industry. I cite here especially the enthusiastic response of participants during the implementation phase and the interest expressed by people in the home building industry. In the view of the external evaluator a clearer understanding of the energy conservation experience of the potential audience would have made program development easier had it been obtained earlier. It might have altered the substance of the final program and instructional delivery system employed in some small measure. On the whole ~~the participants~~ the evidence suggests that the experimental learning is very well suited to the audience for whom it was intended.

To what degree does the experimental learning package help the learner reconstruct or reorganize his/her energy conservation experience?

There are a number of ways in which one might view the experimental learning package to estimate the degree to which the learning package meets this criterion. For example, Do the substantive ideas have direct relevance to the ongoing activities of people in the home building industry? Do the learning activities in the learning package enable the learner to work through the practical implications of these ideas? Are the ideas sufficiently comprehensive and well enough integrated to provide a coherent body of understandings with regard to the designing, building and marketing energy conserving homes?

The overall evidence suggests that the answers to these questions are in the affirmative. Some particular points can be made. (1) The substantive ideas deal very directly with energy conservation in the design building and marketing of homes. (2) They begin with the central consideration of human comfort and extend through a consideration of the role of climate, energy and site, building envelope and thermal phenomena, sun and building shape, fenestration, natural ventilation, daylighting, building materials, design integration and finally marketing techniques for energy conserving homes. In these two senses, then, the ideas have direct relevance to the ongoing activities of people in the home building industry.

The learning package itself relies heavily upon audio-visual presentation of substantive information. The constraints of a developer-free learning package would seem to require this. Coupled with this didactic instructional approach are a variety of follow-up activities including discussion, problem solving and simulation exercises. Participants work on these follow-up

activities either alone or in small groups of different sizes. There is opportunity for interpersonal exchange and testing of the presented ideas in the context of participants' own backgrounds of experience. (As external evaluator, I am a little unclear as to how effective these follow-up activities have been. The little evidence I have, plus my estimate of the overall quality of these learning activities, would suggest that they are effective. Perhaps further evaluation of these follow-up activities should be recommended.)

The ideas presented seem to be sufficiently comprehensive and well enough integrated to provide a coherent body of understanding with regard to the designing and building of energy conserving homes. In the view of the external evaluator, the marketing aspects of the program do not appear to be well integrated into the package as whole. In some ways the external evaluator is naive with regard to how the activities home design, home building and home marketing could be integrated. One example of that integration which the Home Energy Conservation Project pioneered is the Computer Based Economic Evaluation. In any event it seems clear that the home design and home building aspects of the experimental learning package are suitably integrated.

Overall, this would suggest that experimental learning package provides an opportunity for learners to reconstruct or reorganize their present understandings of energy conservation in the design, building and marketing of homes. It should be pointed out here that this conclusion is based on the professional judgment of the evaluator and based on a background of experience

as an educator (not a builder) and on a relatively close monitoring of the efforts of the Home Energy Conservation Project.

To what degree does the experimental learning package have the potential for adding, or does add, meaning to the learner's energy conservation experience?

Being neither a specialist in home building, architecture or marketing the external evaluator is somewhat handicapped here. Nevertheless, the clear impression gained through the experience of the project through the development and implementation of the experimental package is that the program is meaningful to participants in the home building industry. The ideas have a sound theoretical and research base in architecture. Within the program the ideas are developed with clarity and precision and presented in a context that is apparently meaningful to the participants. Although these judgments are based on informal evaluation data the evidence is convincing to the external evaluator.

The summative evaluation data submitted by Higginbotham Associates tends to support this position especially in regard to attitude change. (See Higginbotham Associates revised report and Summary section of this report.)

To what degree does the experimental learning package have the potential for increasing (or does increase) the learner's ability to direct his future energy conservation experience?

This is the most crucial question. When viewed from the standpoint of experience with the project and a careful study of the experimental learning package itself the evidence would suggest that the Home Energy Conservation program does have the

potential to increase the learner's ability to conserve energy in respect to home design and home building. Nevertheless, there is no evidence to suggest that those exposed to the experimental learning package did actually show an increased ability to conserve energy in home design and home building. From an evaluator's standpoint it seems clear that although the program clearly identifies and explains energy conserving courses of action that are meaningful to participants in the home building industry there is still no evidence to suggest that those who have experienced the experimental learning package have, in fact, adopted any of these courses of action in their day-to-day activities.

These findings are probably not unusual. Had the implementation (quasi-experimental) phase been conducted under more normal conditions (e.g. not during an energy crisis); with more carefully developed measuring instruments and using data from samples three or four times the size of the samples used evidence might have been generated that would answer the question convincingly. As it is the summative evaluation data is not convincing either way.

Summary

Reservations have been expressed about the summative evaluation data in earlier sections of this report. Nevertheless, an examination of these data is appropriate.

The 2 x 2 analyses of variance comparing the test group and the control group at comparable different points in time suggest that the experimental learning package was definitely effective in improving attitude. The differences here are highly significant and the difference is maintained over time. The test group and the control group differ on the knowledge measure when they are compared at the initial and final testing. This difference is significant ($p < .0064$). The differences on measures of behavior are negligible and none are significant.

It should be pointed out that most of the attitude questions are knowledge-based, that is, they ask for opinion about the value of bits of knowledge that were part of the experimental learning package. In this sense they are opinions about matters of fact. The items measuring knowledge represent a very small sample of the bits of knowledge covered in the program. It is not entirely clear what the implications are of these two statements. The most favorable interpretation would be that the knowledge component of the experimental learning package, and this comprised most of the experimental learning package, was highly valued by the test group. Knowledge, that in their opinion, as measured by that attitude scale, had relevance and potential utility in their energy conservation experience. If this can be said to be the case one might choose to interpret the measures of attitude and knowledge together and argue that the experimental learning package had a very significant affect on the test groups' understanding of the principles and practices of energy conservation in the home building industry.

(The external evaluator is inclined toward this interpretation especially after reviewing the items on both scales and noting their similarities).

There is still no evidence of impact on behavior. That is perhaps understandable in part because of the difficulty of measuring behavioral outcomes but perhaps more importantly because inducing change in complex patterns of behavior like the designing, building and marketing of homes is very difficult to do. This may suggest that good educational programming like the experimental learning package might be coupled with other means for inducing changes in behavior (e.g. a program of incentives or rewards) that would help insure that the new understandings were put into practice. Home builders are probably like other people in that just "knowing how to do it better" may not be enough.